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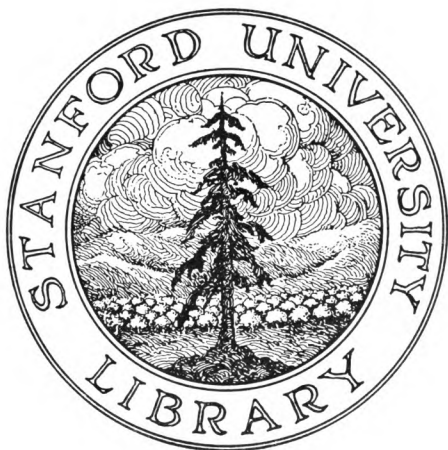
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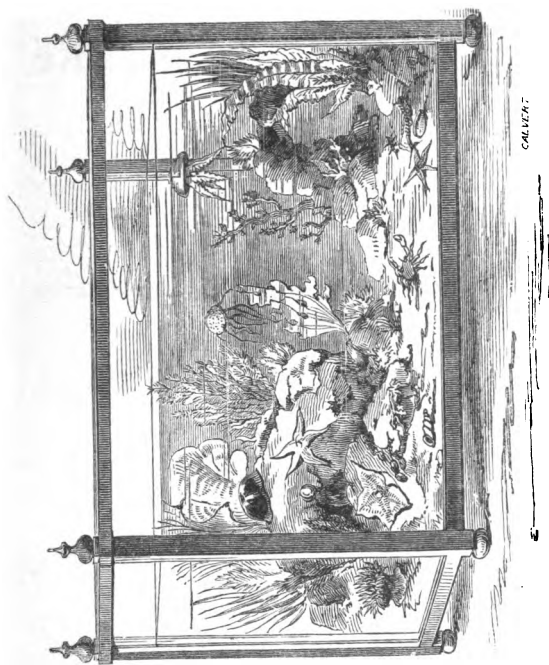
Sea and river-side ram

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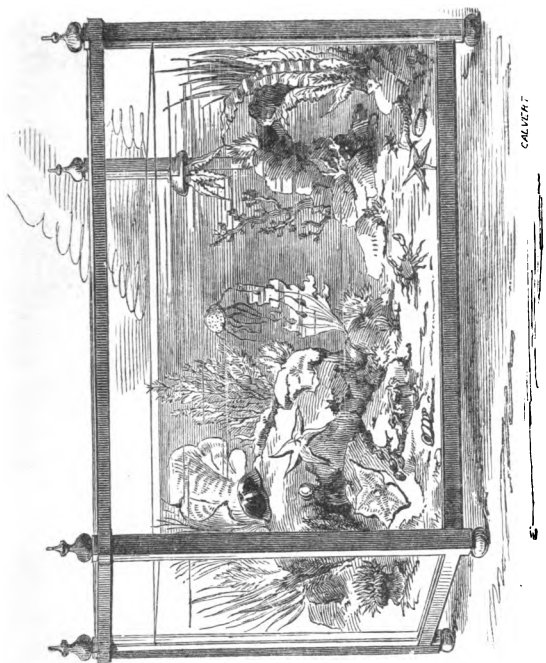


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The Marine Aquarium.



The Marine Aquarium.

SEA
AND
RIVER-SIDE RAMBLES
IN
VICTORIA;

BEING A HANDBOOK FOR THOSE SEEKING RECREATION DURING
THE SUMMER MONTHS.

Wm. A. Ford

"The winds of heaven blew, the ocean rolled
Its gathering waves—ye felt it not. The blue
Bared its eternal bosom, and the dew
Of summer night collected still to make
The morning precious: Beauty was awake!
Why were ye not awake?"

KEATS.

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TO
DR. FERDINAND MUELLER,

GOVERNMENT BOTANIST OF VICTORIA,

This Little Book,

IN APPRECIATION OF HIS GREAT LABOURS IN THE CAUSE OF SCIENCE,
HERE AND ELSEWHERE,

IS DEDICATED, WITH MUCH FRIENDSHIP,

BY

THE AUTHOR.

86463

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CHAPTER I.

INTRODUCTORY.



REALLY as a taste for Marine Zoology has been diffused by the numerous beautifully illustrated and charming books, which within the last few years have appeared from the English press, they are nearly all costly, and many of them of too technical a nature to prove of real value to the masses, who at the approach of the hot winds of Summer flock to the Sea-shore, and we pen these pages with the hope that the chatty form in which we have endeavoured to impart a few of the gleanings made during several years' rambling in the Colony, may take this Book into the hands of many, who, perhaps, having a lurking taste for the subject of which it treats, would be deterred from its perusal, were it of a more precise or scientific character.

"Great cities," remarks Professor Harvey, in the Preface to his splendid Work on the Seaweeds of our Coast, "are springing up in the Australian Colonies; and watering places, to which the citizen takes his family to enjoy the sea breeze during the summer time are coming into being," still, a residence at the

▲

Sea-side soon becomes very monotonous where the mind has not full occupation, but following out a few of the hints contained in the following pages, inducements will be found for taking exercise in search of some of the many beautiful objects of the Sea-shore, and so all the functions, bodily and mental, may be maintained in a healthy state.

" Not lost the time in Sea-side ramble spent,
Braced is the frame, and mental health is gained."

With such glorious teachers as Gosse, Lewes, Harvey, and Rymer Jones, we have often preferred giving a vividly written passage from some one of their Works to anything of our own, and in the preparation of this Work have wished indeed "that some one more skilful had undertaken it, but still it is better even *we* should undertake it than it be left undone."*

* Cicero.

CHAPTER II.

"To one who has been long in City pent,
 'Tis very sweet to look into the fair
 And open face of heaven,—to breathe a prayer
 Full in the smile of the blue firmament."—KEATS.

THERE are certain times and seasons when the mind, so dependent on a healthy state of the body for a vigorous development, worn out by constant toil and anxiety, becomes thoroughly unstrung, and unless a change of scene and companions can be at once obtained, it soon becomes impaired, and sooner or later the consequences are seen in one of the many tedious nervous diseases unfortunately so prevalent in this country. A change into the interior is scarcely likely to prove as beneficial to the man of sedentary habits as a run by the sea, where the "stormy winds do blow," and where the long lost appetite quickly returns, and the mental faculties resume their wonted spirit and energy.

We write from experience, for rendered irritable by long confinement, and as a climax, the intense heat of the anniversary of the well-remembered Black-Thurs-day, when the inhabitants of our tank, one after another, were found lying, not "scentless" certainly, but "dead," and the numerous fresh-water Algæ, so carefully preserved, each in its separate bottle on our mantel piece, waiting until we had leisure to investigate them, had withered, we hastily packed up a few choice books, a good supply of glass sample bottles,

the use of which will be apparent by and by, a few quires of blotting paper and muslin strapped between well-seasoned boards, and our microscope, determined to explore some of those glorious dark crannies and sheltered nooks which for months past had formed the subject of our dreams, day and night, and which add so considerably to the charm of Sea-side rambling. But where to go then became a matter of grave consideration,—Hobson's Bay, Geelong, Queenscliff, all had something to recommend them, but we wanted companionship and quiet as well as fresh air, and so Warrnambool was decided on to be visited first, with a hope to call, as our leisure would allow, at all these places on our return. The trip to Lady Bay, a few years since one of so much discomfort, having to be made in diminutive crafts, not particularly well provisioned, is now really an enjoyable one, and where it formerly occupied from a week to an indefinite period at the caprice of the winds, is now performed in about eighteen hours in steamers, well officered and well furnished in every way. The weighty point "where to go," being thus decided, we were before many hours had passed over our heads safely ensconced on board the "Lady Bird," and in spite of the gloominess of the morning, the mere anticipation of what we knew to be in store for us soon dispelled all the feeling of "hippishness" which had beset us for many weeks previously. Although steaming along the coast for a considerable portion of the passage, there is nothing of interest to observe after passing the Heads, except the few chance vessels which may be sighted, and the Cape Otway

Light, always anxiously looked for. So far then on our way, after watching awhile the phosphorescence of the waves as our vessel dashed through them, we turned in, and were awakened at an early hour in the morning by the announcement that Warrnambool was in sight; our toilet quickly made, we went on deck just as we steamed past Curdie's inlet, where, it will be remembered, the "Schomberg" was wrecked, and in a short time the pretty little town which was to be our temporary abiding place, loomed out from its shelter of thick timber. We now pass the mouth of the river Hopkins (about a mile from the port,) which is barred by a reef of rocks whereon the surf dashes heavily, it is a pretty object, the rugged crags dotted here and there, on which rest lazily enough a group of Cormorants, and the little blue Heron, reminding us of the singular tail pieces which illustrate some of Bewick's works. The white sand hummocks thrown up on shore are objects of interest to the stranger; but the anchor drops as we steam into the snug little Bay, so well protected by the dense bed of Kelp, and the Gulls and Terns fly screaming overhead, indignant apparently at our intruding into their usually quiet haunts, but we shall make acquaintance with them anon we dare say. After being landed by the worthy Harbour Master, we prefer, having suffered severely from the feeling of *mal-de-mér*, worse infinitely than the reality, to walk to the town, to the residence of an old friend, where the inner man, a dreadful sufferer on these occasions, being recruited, we saunter out through the town. We had resided here for many years, but in a comparatively brief

absence observed marked improvements, thanks to the Local Powers, (the Road Board, and the Municipality,) good roads, Government buildings, a Light-house, Obelisks to serve as land-marks, and a tramway to the Jetty, all proving the importance, from the large agricultural population surrounding it, of this little town. There are now too several respectable hostelries, where but a few years since there was only one, and the visitor will find comfort in any of them.

We have an intense horror of being idle, so adopting the advice of Goethe not to—

“Defer

Until to-morrow, what may to-day be done,”

We call upon, and capture a Correspondent on Natural History topics, whose zeal in scientific pursuits we had long been aware of. Greetings interchanged, for Naturalists require no formal introduction, we started with the intention of exploring the rock-pools westward of the town. Arrived at our hunting ground after crossing the Merri River, noticing as we climbed the hill a species of the rush-like *Xerotes* in flower, we found the sea far too rough, and the sky too unpropitious to allow of our peering into the haunts of such creatures as we are in search of; yet nothing daunted we recross in our frail punt, bottling by the way a pretty species of a Diatom, (a *Gomphonema*), which fringed its sides, and away by the beach towards the Hopkins, to see what might turn up, since we verily believe with Wilmot, whose delightful “Summer Time in the Country,” we would wish was more generally known, that “open eyes are always learning,—a garden, a wood, even a pool of

water encloses a whole library of knowledge, waiting only to be read." How much more will the wide expanse of Ocean afford us, so densely filled with vegetable and animal life, that the mind grows fairly "dizzy wi the thought."

Unpromising as were our first glances, we walked along, sniffing the delicious odour of the seaweed, chatting of and arranging our plans for future rambles, when our friend exclaimed exultingly, "*Quo minime credas gurgite, piscis erit*," and truly here, where and when we least expected, our attention was arrested by millions of minute gelatinous-looking objects; we take up one, banded with pink of the faintest hue, another, and another finds its way into bottle No. 2; these were evidently a species of *Acalepha* or Sea-blubber, but we were unable to identify them; intermingled with them, and somewhat alike in appearance, though differing in shape, were numerous specimens crested with purple, of the bladder of the Portuguese man-of-war, (*Physalia*), included by Cuvier amongst the *Acalephes Hydrostatiques*, from its large swimming bladder, which, being easily compressed, enables it to regulate its specific gravity at will—to rise or sink at pleasure; hanging too from its under part are *cilia* or arms, and various other organs, which probably serve the purpose of nutrition and reproduction. According to Owen,* these appendages are of three kinds—urticating, digestive, and (probably) generative. The urticating tentacles being the longest, hollow, and provided with muscular fibres, of which the most conspicuous are longitudinal, and serve to retract

* Comp. Anat. Inverteb., p. 176.

them ; they contain many corpuscles of a reniform shape, and are richly provided with thread-cells, whose filaments are of the spiral kind. The gastric appendages are shorter and wider, and are provided with stomata, which are applied to the prey, seized and benumbed by the tentacles. If the prey be small, it is sucked bodily into the gastric sac ; if large the sac becomes distended with its juices and dissolved parts, the gastric secretion being a very rapid and powerful solvent. The mouth of each sac is wide, with a broad everted lip, armed with a series of "nettle cells." The whole gastric appendage is highly contractile, and in constant motion in the living animal. Great was our joy as we sat examining these gem-like creatures, quite forgetting the old adage, that "time and tide tarry for no man," until a huge wave compelled us to decamp hastily, and when well beyond its reach we observed on looking round, our collecting bottle into which our treasures had been placed, floating away high on the crest of one wave, now deep down in the trough of another, fairly out to sea,—a sad loss ! for before it could be replaced, the tide would have carried away the very specimens we were so anxious to procure. After mourning awhile, and at length somewhat appeased by the consolations of our companion, we set to work anew. Anon, something very much like the object we had lost so prematurely appeared about fifty yards a-head, but bottles are unfortunately too common objects of our shores, so we sauntered slowly towards it, hoping at the best to find the wherewith to make an impromptu aquarium, when to our great joy, here,

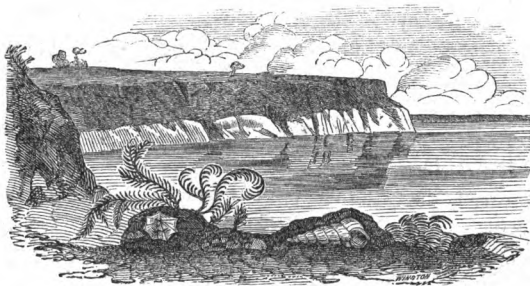
uninjured, well-stoppered, and with its inhabitants none the worse for their trip back to their native element, was our lost one ; this inspired us with fresh vigour, and not finding much that we cared for on the beach, we set to examining the huge Kelp roots, and they were well worthy of it, as the keener eyes of our fellow-labourer soon detected. We had but a moment since been recalling poor Forbes' amusing account of his suicidal Starfish, (*Luidia*), (see his "British Starfishes," page 138), and we had an illustration of it with an *Ophiurus*, also a Starfish, but so named from the lizard-like appearance of its arms, which we had turned out from one of those same densely-matted kelp-roots ;—off went first the extremity of one arm, as it lay in our hand,—then, with an impudent twist, the smallest bit in life of another, whilst horror-stricken we called hastily for a collecting-box to receive him, or rather all that was left of him,—little enough indeed,—since all that was secured entire was his disk, and on a glass-jar on our mantel-piece he wandered for many weeks amidst his rejected members, which still maintained their vitality, frequently protruding their suckers. Sir John Dalyell mentions having picked up a single ray of a Starfish, which in a few days reproduced four additional ones, all smaller than the original, but this after a time dropped off, leaving the animal more perfectly symmetrical, and the renovated creature entered vigorously on its new career. *

But let us examine these suckers more closely, since they seem to act pretty much in the same manner as the leather toy we, as school-boys, amused ourselves

* "Aquarian Naturalist," p. 267.

with, and by them there can be little doubt that progression is effected. Their mechanism, we learn from Gosse,* is very simple. At the bottom of a furrow in each ray are rows of minute pores, through which the suckers are protruded, the base of each sucker being expanded into a little globular vesicle, which lies above the pore in the interior of the ray; the walls of this vesicle are muscular, and therefore contractile, and it is filled with a fluid. When an animal wishes to protrude and extend any given sucker, it contracts the vesicle at its base by an effort of the will; the fluid is thus forced into the tubular stem which is therefore compelled to elongate, and on the removal of this contractile force, the fluid returns to the bladder, either by the elasticity of the tube, or probably by its muscular action, and the sucker is gradually withdrawn.

We are treading shells under our feet at every step, and as yet have said nothing of them, beautiful as they are, and must reserve it now for another chapter, since we cannot dismiss forms varied as they are graceful, with any hurried remarks.



* Gosse's "Life," p. 102.

CHAPTER III.

" There are curious things of which men know
As yet but little.

Shells
Which ocean flingeth forth from off her billows
On the low sand.

UNFORTUNATELY for our knowledge of Conchology, collectors content themselves too frequently with gathering the dead and empty shells washed up by the tide, as if they, fractured, waterworn, and colourless, could give any idea of the glorious creatures which had inhabited them;—as well might they judge of a man's habits and character by walking through his house;—and it is the mere formation of cabinets for the beauty of the shells which has led to this being considered a frivolous study, and so, without knowing the habits of the animal, and its conformation, affecting the form of the shell so very materially, it is. Still collectors often hunt up objects which had escaped the eye of those more educated in scientific pursuits, so instead of criticising the past, we will rather give a brief digest of the peculiarities which characterise this division of the Natural Kingdom, as well as some few hints for the guidance of the Amateur Naturalist in his researches for the future.

Shell-fish then, be it known, belong to that division of the Natural World called "*Mollusca*," from the Latin word *mollis* (soft), their bodies consisting universally of a soft consistence and generally

protected by a hard shell, Univalve or Bivalve. Taking first now the *Univalves*, which have a distinct head, eyes, and tentacles, the mouth being armed with jaws, we find that Cuvier has arranged them into three classes, the animals belonging to the first of which are termed *Cephalopoda* (from *Cephale* the head, and *poda* feet), because their feet, or rather arms, which are attached to the head form a circle around the mouth; the Cuttle fish is a familiar example, and its shell, which is internal, as in almost all comprised in this class, is constantly thrown upon our shores;—the beautiful little discoidal chambered shell of the *Spirula*, is not uncommon on the Warrnambool and other of our coasts, the animal itself would indeed be a prize, for although an inhabitant of all the warm seas, it is not often met with.

The animals of the second class, or *Gasteropoda*, of which the common garden snail is a good type, creep by the successive expansion and contraction of their broad muscular foot, which is formed by the under side of the body, and thus the name of the class is obtained from *gaster*, the belly, and as before *poda*, feet. Some breathe air, (pulmonifera), others water (branchifera.) Many of the individuals of the latter division close their habitations with a horny or calcareous covering called an *operculum*, and it presents strange modifications of structure; we find it in some spiral, in others concentric, and occasionally claw-shaped; that of a *Natica* found on the Western Coast, is commonly used as card counters, and we have seen them polished and tastefully mounted as wrist studs and shawl pins.

Our shores give us many Carnivorous Gasteropods, for example, *Murex*; *Fusus*, or Spindle shell; *Nassa*, or Dog-whelk; *Purpura*, or Purple shell, (some species of which afford a dye); *Conus* or Cone shell; *Voluta*; *Mitra* or Mitre shell; *Cypræa*, (Cowrie), &c., &c. Livningstone, in his entertaining travels tells us that the chief Shinte, as a last proof of his friendship came into his tent, which he closed to prevent the possibility of there being any witnesses to his extravagance, and then presented him with the conical end of a Cone shell, adding as he did so, "There now you *have* a proof of my friendship." So high a price was set on these shells, that five of them would be a handsome sum for an Elephant's tusk worth £10.

In brackish water we may find many of the Sea-snails, the pretty little mottled *Natica*, the long spiral *Cerithium*, and on the rocks at Lady Bay we have seen specimens of the *Siliquaria* or Pod shell, which is longitudinally slit all along its twisted spire; the *Litorina* or Periwinkle, is always found within the action of the tide, as it feeds on sea-weed, and the brackish lagoons afford us the pretty minute Looping snail (*Truncatella*) in abundance, and it has one recommendation that it can survive for a considerable time in the mud, when the water has been dried up by the Summer's sun.

The richly-colored Pheasant shell (*Phasianella*) should be sought after eagerly on the Warrnambool and other shores, since it forms so lovely an object for the Cabinet; its generic name has its origin in the resemblance of the markings of the shell to the plumage of the Pheasant (*Phasianus*): the hoop shells

Trochi, are found attached to rocks on all our coasts ; of the Ear shells (*Haliotis*), and Boat shells (*Chiton*), we shall have much to say hereafter when we meet with them.

Of the *Pulmonifera* or air-breathing Mollusca, some are terrestrial, others fresh-water, and many inhabit damp places near the sea ; their respiratory organ is so simple a form of lung, that this order is called by Gray, "concealed lunged," as the orifice is small and valve—like to guard against the entry of water in the aquatic tribes, and to prevent the rapid desiccation in the land snails.

The latter do not abound in Australia, but we find abundant interest in the beautiful shells which exist in the Yarra, the Moorabool, the Merri, and other of our rivers, lurking on the large, ovate, floating leaves of the Nymphaea-like *Dampasonium*, or the broad paler *Potamogeton* (Pond-weed), which is always so gay and refreshing an object, but these we must needs put into an Aquarium to watch with the aid of a pocket lens their structure and habits. We place along with them some of the green scum which covers the surface of the water (we say scum, but it is in reality a beautiful freshwater Alga,) a *Zygnema* in conjugation, and a few plants, such as *Chara*, the velvety *Azolla rubra* or *pinnata*, one or the other of which is to be met with on the Merri, at Warrnambool ; the Moorabool, at Geelong ; on the lagoon in the Botanical Gardens, Melbourne, and such like situations. The flat many-whorled shell, so brittle,—is a *Planorbis*, this other, ovate-shaped and also very thin with a large aperture, is a *Physa*, so called from its resemblance to a pouch ;

and the one, with the aperture on the right, which distinguishes it from the former is an allied genus, *Limnæa*, or Pond-snail. All these are widely distributed throughout the world. Now then let us watch how industriously they are cleaning off the dark coating of *Conferva*, which has already commenced growing on the sides of our Aquarium, and with this lens see how they use their tongue ; the upper lip with its mandible is raised, the lower lip which is horse-shoe shaped, expands, the tongue is protruded and applied to the surface for an instant, and then withdrawn ; its teeth glitter like glass paper, and in *Limnæa* it is so flexible that frequently it will catch against projecting points, and be drawn out of shape slightly as it vibrates over the surface. *

Both these last species crawl beneath the surface of the water with their shells downwards, the *Limnæa* depositing its eggs, some fifty or sixty in number, in small sacs, and Mr. Hogg, in his valuable work on the Microscope, (Edition 4, p. 423,) gives us some interesting information on their subsequent development, "When examined soon after they are deposited, the vesicles appear to be filled with a perfectly clear fluid ; at the end of twenty-four hours a very minute yellow spot, the nucleus or germ, may be seen near the side of the cell-wall. In about forty-eight hours afterwards, this small germ has a smaller central spot, rather deeper in color, which is the nucleolus. On the fourth day the nucleus has changed its position, and is enlarged to double the size ; upon viewing it more closely a depression or fissure is seen,—this on the

* Woodward's "Manual of the Mollusca.", p. 161.

eight day most distinctly divides the small mass into the shell and soft part of the future animal. It is then detached from the side of the cell, and moves with a rotatory motion around the cell interior; the direction of this motion is from the right to the left, and is always increased when the sunlight falls on it. The increase is gradual up to the sixteenth day, when the spiral axis can be made out, and it presents a striking difference to the soft parts in appearance. On the eighteenth day these changes are more distinctly visible, and the ova crowd down to the mouth of the ova-sac; by using a higher magnifying power, a minute black speck, the future eye, is seen protruded with the tentacles. Upon closely observing it, a fringe of cilia is noticed in motion near the edge of the shell. It is now apparent that the rotatory motion first observed must have been in a great measure due to this, and the current kept up in the fluid contents of the cell by the ciliary fringes. For days after the young animal has escaped from the egg, this ciliary motion is carried on, not alone by the fringe surrounding the mouth, but by cilia entirely surrounding the tentacles themselves, which whips up the supply of nourishment, and at the same time the proper aeration of the blood is effected. Whilst in the ova it probably is by this motion that the cell contents are converted into tissues and shell. From the twenty-sixth to the twenty-eight day, it appears actively engaged near the side of the cell, using all its force to break through the cell wall, which at length it succeeds in doing, leaving the shell in the ova sac, and immediately attaching itself to the side of the glass vase to

recommence its ciliary play, and appear in a still more advanced stage. It is still some months before it grows to its perfect form. One of these snails may deposit from two to three of these ova-sacs a week, producing in the course of six weeks or two months from 900 to 1,000 young,"

It is to the Microscope then we owe this pithy description of the progress *ab ovo*, of a species allied to the common *Limnæa* of our rivers.

We now turn to the Sea-slugs, whose shell, where it exists, is small and thin, slightly rolled and pearly white, and partially concealed by the animal; in *Bullæa* (Bubble shell,) we find an organ resembling the gizzard of a fowl, paved with calcareous plates capable of crushing the shell-fish on which it feeds. Many specimens of this shell we have obtained on the shore at Geelong. The *Pteropoda* our readers are seldom likely to meet with;—the Lamp-shell (*Waldheimia*) is not uncommon, attached by its pedicel to the oysters from Western Port, and its structure is worthy of examination; it belongs to Cuvier's 4th class, *Brachiopoda*, commencing the bivalve section, the animals comprised in which take their name from the ciliated arms on the side of the mouth, wherewith their food is obtained.

The well known bivalve shells of the Oyster and the Cockle are good types of the *Conchifera*, the animals of which are, with few exceptions, aquatic, and range at all depths on almost every coast and every clime. There are amongst them some burrowing shells, as the large white oblong *Anatina* (Lantern shell ?) such splendid specimens of which are found in Corio Bay, a species of *Solen*, or Razor shell, and the

borers are well represented by a *Teredo* which abounds on the piles at Williamstown.

The ability of many molluscs, especially the fresh-water, to sustain life for a considerable time, is recorded in some remarkable instances; indeed it is probable that they become torpid in warm climates during the hottest and driest part of the year.* Mr. Gray, of the British Museum, received from this country a Pond mussel which had been more than a year out of water, and it still lived; some pond snails have been found alive after five years, although in the warm climate of Jamaica, and an individual of the Desert snail which had been affixed to a tablet in the British Museum in 1846, was found, on some suspicion having arisen as to his having made determined efforts to escape from confinement, still flourishing after being immersed in tepid water.†

A Cabinet of Shells is necessary for those who desire to study Conchology, and we may therefore hint, that to obtain specimens, perfect in shape and colour, dredging is the only good plan; but this may not be feasible, if so, the collector should wade amidst the rocks, examining the heaps of seaweed thrown on the sand after a storm, or carefully grope about all dark fissures, where many good species congregate, or are driven, *nolens volens*. Chitons and Limpets are only detached from the rocks by the aid of a strong bladed knife, as the former especially repel the air and water on all sides to produce a vacuum and so obtain a firmer hold, and they will sooner part with a portion of their shells than leave their places of attachment. Bivalves, and all live shells should be boiled

* Woodward's "Manual of the Mollusca." † Ann. Nat. History, 1850.

and the soft parts removed when the valves separate or gape, but in doing this care should be taken not to injure the hinge, as it is often of material importance in the determination of genera; to preserve it therefore it is well to tie the shell round with some light thread. The *operculum* of Univalves must also be preserved, and should the contents of the shell at any time emit an unpleasant smell, a small quantity of chloride of lime will quickly and effectually remove it.

The arrangement of a collection of Shells is a mere matter of taste, much depending on the space that can be afforded to it. We who lead a somewhat nomadic life, prefer keeping the smaller species in small pill boxes, which can be purchased in nests at a trifling cost, the name of each species being carefully recorded on the lid; but a pair of each shell arranged on a cardboard, with the operculum glued down alongside, facilitates easy classification and subsequent examination.

We have not deemed it necessary to enter into a technical description of the *columella*, the *hinge*, and other portions of the shell, as this may be found in any elementary Work on the subject; to the amateur, Miss Catlow's little Manual will be of interest, but to the working Conchologist, we recommend Woodward's "*Manual of the Mollusca*," of which we need only say, that it is one of Weale's series, a sufficient testimony to its excellence.



CHAPTER IV.

Now then having progressed so far that we have some knowledge of the shells with which we are likely to meet, let us again wander this bright morning to the Hopkins River, where we left our readers awhile since ; but an hour ago as we peeped from our chamber window the rain mizzled thickly down, and we had well nigh given up all hope of a country ramble ; but this was only what the Irish peasantry call the "pride of the morning," and any anxiety we might have felt was soon dispelled by the bright gleams of sunshine, pouting out at first, but soon bursting forth in full splendour ; so having made a hasty toilet let us start before the heat becomes oppressive. Well supplied with all that is needful for any thing that may turn up, we are soon away, shaking the dewdrops off the grass, the pink flowering *Convolvulus*, and the pale blue *Veronica*, or Speedwell. The Hopkins River is about a mile and a-half to the eastward of the town, and the walk to it is full of interest, but as the day is young yet, we may even linger on our way. Let us visit the little spring exuding from the rock near the tunnel, and gather, "en passant," specimens of the *Colobanthus Billardieri*, which though an uncommon plant, abounds here, and then descend towards the Pertrobe Lagoon, noticing on the embankment of the hill cutting the shining-leaved *Trachycaryon Klotschii*. We stay on the water's edge for a time to note the elegant little

Triglochin decipiens, (*Arrow-grass*), the blue *Mimulus* or Monkey flower, and other plants which choose such moist situations; nor can we resist the pleasant shrill chirp which issues ever and again from the dense cover of the rushes; it is that of an old friend, which from its habit of flitting through the reeds and low grasses is only imperfectly known, and it cost us, we remember, some years since, many hours of patience before we could ascertain from what source the Grass-hopper-like chirp emanated. With us it is an especial favorite, like the Blackcap, more frequently heard than seen, so retiring indeed that it seldom emerges from the concealment afforded by the plants common to low lying wet lands, but occasionally may be seen clinging gracefully to the heads of the rushes, where probably it obtains its food. Its wings are remarkably short and ill adapted for flight, still it appears to flit from place to place with marvellous rapidity; the beak is nearly black, with strong bristles at its base; crown of the head ferruginous; back and wings of dark olive with black markings; a streak of very pale blue extends from the base of the bill over the eye on each side. Throat, pale blue in the male, but rufous in the female; the tail, which is three inches in length, nearly as long again as the whole body, consists of six feathers with slender black shafts webbed on each side with minute hairy filaments at equal distances; and so like are these feathers to those of the Emu, that this bird has received the name of the Emu Wren. Its nest is of grass lined with feathers, and is in fact a perfect ball concealed in tufts at the trunks of trees

Walking around the Lagoon, which is now nearly dried up, we collect shells of the *Cyclas*, *Nassa*, and *Truncatella*, and we also discover here a rare Diatom, *Meloseira nummuloides*; towards the Merri River we find *Ruppia maritima* (Tassel grass,) and the Brookweed, *Samolus littoralis*, a small white flower ever so slightly tinted with pink on a slender rigid stem. Passing near the Jetty, where are dense beds of the beautiful spathulate-leaved blue flowered *Scævola suaveolens*, we wander over the low sand hummocks which are so conspicuous a feature here; keeping all the way in sight of the sea, we observe the shrubby *Pimelea serpyllifolia* flourishing all along their ridge, and the gay scarlet flowering *Kennedya*, forming a gorgeous carpet, with here and there the flesh-tinted *Caladenia*, with its long lance-shaped leaf. Resting awhile to inhale the exhilarating breezes so tantalisingly appetising, which are wafted in from the ocean, we remember that we must take the track over the hill, to obtain two plants of interest, which we saw blooming there many seasons back without at the time gathering specimens,—the one is the blue, leafless, waxy-looking *Lobelia gibbosa*, the other (and its abundance in this spot will prevent any doubt in identifying it) the *Gentiana montana*, which has delicate white or straw colored corollas, beautifully veined with blue of the palest imaginable tint. These secured, we clamber over the steep hill, passing by numerous deep holes, concealed almost by the thick bushes of the wild Raspberry, the Forget-me-not, and other of our indigenous plants;—they are the burrows of that uncouth creature, the Wombat, which is very

numerous along the coast. A worthy friend in the town has taken much pains in endeavouring to rear the young of this and others of the Marsupialia. Great, indeed, was the grief of the townsfolk, when his first protégé, "Peter" died; a general mourning when the second of the same name drowned himself in some soup; but now to console him, he has successfully brought up two young Wombats, taken from the pouch of the mother which he had shot, and these "puir mitherless bairns" follow him about in his peregrinations, without exhibiting any of that timidity which, in their wild state appears natural to them.

The summit of the hill being gained, we have a pretty peep of the river through the clusters of *Casuarinæ* (She-Oaks), Cherry trees, (*Exocarpi*), and Boxwood (*Bursaria*), which are left to ornament and protect the Botanical Gardens in course of formation on the bank higher up. Breaking through a thick low scrub of *Beyera viscosa*, we approach the Hopkins River, through whose mouth the stream rushes by a narrow channel into the sea, but, ye stars! Look upon the heap of fine silvery bream and yellow speckled salmon trout, our companion, who was to join us here, has secured!!; "its the early bird," says he, still we had not been idle, and these made us look forward to breakfast hour with some eagerness, and an appetite which many would envy. We try our luck; but not a nibble can we get, and we verily believe these cannibals of fish are finishing their morning meal elsewhere, so we stow away our fishing tackle, form our rods into handles for landing nets,

and as the morning air is still chilly, light our pipes and roam away amidst the deep holes, startling myriads of crabs and small fry of all kinds. Our friend hears with amazement that the *Actinæ* (Sea Anemones) are unknown to us in this locality, so we hasten to where the waves are dashing in over low flat rocks, glittering with the tasselly bead-like *Conferva Darwinnii*, and the dark green *Codium tomentosum*, of which there is also an attenuated form in the same or similar situations. We endeavour to reach one, in fact *the* spot, but are driven back by the heavy waves, yet by perseverance it is at last attained, and oh! the charms which a hasty glance revealed to our wondering eyes, so rapid, indeed, that any attempt at describing species would be entirely out of the question,—there were—

" Living flowers, that rooted to the rock,
Late from the thinner element,
Shrunk down within their purple stems to sleep,
Now feel the water, and again
Awakening, blossom out
All their green anther necks."

And well has the Poet Southey described this habit of these beautiful creatures; seeing them hanging either like deep-red gelatinous masses from some dark rocky recess, or concealed entirely under every ledge where they may lie unharmed, it would be nearly impossible to recognise any affinity to the lovely tinted forms expanded here before us, crimson, green, pink and white striped, olive spotted with dark brown, white with yellow tentacles, all eager to clutch any small *Mollusca* or *Annelida*, which the returning tide may bring within their reach; for delicate as they appear,

they are voracious enough, take our word for it, and Johnston in his "History of British Zoophytes,"* relates, that a specimen of *Actinia crassicornis* which had been originally two inches in diameter, had somehow contrived to swallow a valve of *Pecten maximus*, (Scollop Shell) of the size of an ordinary saucer. The shell, fixed within the stomach, was so placed as to divide it completely into two halves, so that the body stretched tensely over had become thin and flattened like a pancake. All communication between the inferior portion of the stomach and the mouth was of course prevented, yet instead of emaciating and dying of an atrophy, the animal had availed itself of what undoubtedly had been a very untoward accident, to increase its enjoyments and its chances of double fare. A new mouth, furnished with two rows of numerous tentacula, was opened up on what had been the base, and led to the under stomach; the individual had indeed become a sort of Siamese twin, but with greater intimacy and extent in its unions!! Let our lady readers, who are so enthusiastic about pets of this kind, have a care of their crockery, more particularly as Lewes also informs us, that "anything and everything is carried straightway into its stomach to be there tried, and rejected only on proved incompatibility.†

It is from Gosse, Rymer Jones, and others, whose beautiful Works on all the objects of the Sea-side display evidence of such untiring research into their habits and economy, that we place the utmost reliance in

* Vol. 1, page 235, 2nd Edition. † Sea-side Studies, p. 127.

them, we learn that the tentacles of these creature are prehensile, and this power depends on the presence of tiny barbed weapons coiled in elastic cells, which are found in inconceivable multitudes in the tissues of the tentacles, of the lips, of the stomach, of the frilled ovarian bands, and especially in some species, in long threads or filiferous capsules, which are protruded from pores in the integument of the body.

The structure of these weapons is as follows : Each consists of an oval or elliptical sac of transparent membrane, within which is seen a thread coiled up, and in some instances an oblong or lozenge-shaped chamber. At the pleasure of the animal, or under the stimulus of pressure, this thread is shot forth from one end of the cell with great force, until it extends to a length from twice to fifty times that of the cell. When fully extended it is seen that the thread is but a continuation of the cell itself, that when it was dormant it was turned in, and that in the process of expulsion, every part of its length has actually been turned inside out like the finger of a glove. Sometimes the thread appears simple, but in those cases in which a chamber appears within the cell, it is furnished with an armature of barbed weapons, which, after expulsion of the threads, project from their sides in all directions. The propulsion of these small threads is sufficiently forcible to enable them to enter the tissues of animals, and the barbed structure enables the weapon to retain its hold in the flesh, which facts Mr. Gosse (from whose Work* the foregoing has been sketched) thinks,

* "Life," page 69.

warrants the presumption, that a highly poisonous fluid is injected at the same time, capable of arresting and destroying animal life.

At a recent meeting of the Dublin University Zoological and Botanical Association, Dr. M'Donnell stated in reference to the urticating organs of the *Actiniæ*, and on the spasmodic action caused by them when suffered to touch the nerves of a frog prepared for electrical experiments, that at one time he had thought this was caused by electricity generated in these animals; but that further experiments and the use of a very delicate galvanometer had caused him to abandon this view, and to ascribe these movements to the local irritation caused by the poison contained in the cells of the *Actiniæ*.*

These stinging properties are mentioned by various authors from Aristotle down to Johnston; but Mr. Lewes agrees with Sir John Dalyell, that the tentacles do not secrete any poison, as from experiments repeatedly tried, he finds that animals frequently escape unhurt after being seized by the tentacles; probably, however, it may be present to a greater degree in some species than in others, and more fully developed at certain seasons; hence the diversity of opinion amongst so many really observant men. The grasp of the Hydra is, as Johnston remarks, "eminently poisonous," small water-worms which this polyp is only able to attack, are so tenacious of life, that they may be cut to pieces without their seeming to receive any material injury or pain; yet the poison of the Hydra instantly extinguishes every principle of life

* Year Book of Facts, 1859, p. 244.

and motion.* From analogical reasoning then we may fairly conclude that the *Actiniæ* do possess the powers attributed to them, at any rate there can be no doubt of the peculiar rasping sensation experienced when the finger is touched by the tentacles. Landsborough† mentions that the Italian epicures eat many kinds of *Actiniæ* as food, and adds, that they smell like a large lobster, and form to their taste a savoury repast, and we should certainly give them a decided preference to the *Cephalopoda*, (Cuttle fishes, &c. &c.) which are so much appreciated in the Indian, or the Trepang (Sea Cucumber), in the Chinese market.

And so we sit chatting, until fairly driven away by the incoming tide, the spray from which has already given us wet jackets, nor by the way are our knees one whit improved by kneeling on the sharp muscles which cover every part of the coast, and the sun is getting high too, so we get ferried across the river, and wander along its banks, festooned with the yellow *Zygophyllum Billardieri*, the elegant Myrtle flowering *Myoporum*, and the blue *Dianella*, until we arrive at the house of a friend, whose hospitable door is ever open to the traveller, and here we were entertained with much kindness, and even as Isaac Walton's hostess dressed his fish after his heart, so did ours, quite in accordance with our ideas of gastronomic skill. But we must not linger here longer than is necessary, and once more buckling on our knapsacks, we are in a short time wending our way with light hearts to the precipitous cliffs, overhung with dense clusters of the

* Smellie's Phil. Nat. History, 11, p. 462.

† History of British Zoophytes," page 241.

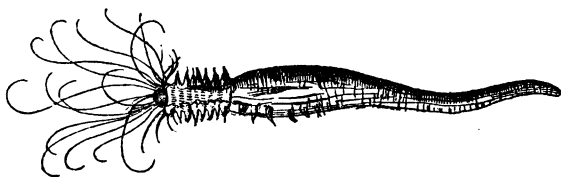
red-leaved *Rhagodia nutans*, the sweet-smelling white flowering *Alyxia buxifolia*, and the handsome Composite, with Rosemary-like leaves *Ozothamnus turbinatus*, and now scrambling down where a small declivity presents itself, at the immense risk of being immolated on the rocks beneath for our daring, we are once more on the sea beach, not without startling a splendid Wedge-tailed Eagle, which had evidently been in search of food here. He alights again not far off,—take this glass, and see what a splendid fellow he is, standing so proudly erect in his dark-brown coat, and with such vividly bright eyes. From the middle tail feathers exceeding the outer by some four inches, the tail has a wedge-shaped termination, from which the Eagle gets its popular name. The earliest account of this bird was given by Collins in his “English Colony in New South Wales, in 1802,” but no mention is there made of the wedge-shaped tail. The individual there engraved was captured by Captain Waterhouse near Broken Bay, and showed his immense strength by sending his talons through a man’s foot, whilst lying at the bottom of a boat with his feet tied. The head, too, is beautifully figured in Mitchell’s “Australian Expeditions,”* and the brilliancy of the eye admirably delineated. We remember once at a pic-nic near this spot, whilst luncheon was being spread out on the grass, a splendid fellow hovering over us for some time, decamping only when a rifle ball was sent through his tail feathers, as an intimation not to try closer quarters, but little did he seem to heed this so courteous a message. Magpies are

* Vol. 2, page 264.

evidently at feud with this as with all birds of prey, and buffet him as he flies along without making much impression.

The mode adopted by the Wedge-tailed Eagle of capturing the Opossum is interesting;—he goes to a hollow tree in which it is probable his victim may be located, and with his talons, scrapes the bark, until the Opossum becoming alarmed, rushes out and is soon pounced upon by its crafty foe. The natives aware of this *ruse*, resort to a similar plan; they take a piece of rough wood, and scrape it over the surface of the tree, with precisely the same results.

But the sun is over the yard-arm, so we, like other of our fellow-workers and travellers, cry “spell-ho,” until our next chapter.



CHAPTER V.

"Pale glistening pearls, and rainbow-coloured Shells,
Bright things that gleam unreck'd of."

BEFORE again starting, our party is reinforced by some friends who desire to be initiated into the wonders of the Sea-shore, and we ramble along a little deep in the sea water, now enriching our own vasculum, and now explaining to some of the younger of our companions the habits and construction of many curious things with which they load themselves. One of them gathers some very beautiful *Echini* (Sea Eggs or Urchins) to which the spines are still adhering, and we save some for microscopic examination since they are important in the identification of species, varying probably in each. We mentioned before, (page 9), the peculiar suckers of the Starfishes, and those of the Sea-eggs are very similar. The beautiful (so called) shell of this creature is but little known, or it would surely be more appreciated; it is composed of five pieces admirably joined together, so as to form its habitation, and is perforated at each extremity by two large openings, one of which is the mouth, from which project five polished pointed teeth, better adapted, we should have thought, for large Molluscs than a vegetable diet of *Algæ* and *Desmidiæ*. The calcareous plates (which are more easily examined when the spines are rubbed off), may be divided into two sets, varying as well in shape as in their use,—the larger being studded with hemispherical tubercles of consid-

erable size, attached externally to articulate with the moveable locomotive spines. Each of these large plates has somewhat of a pentagonal form, those situated near the mouth and apex being considerably smaller than those at the centre of the shell;—there are ten rows of these tuberculated plates, but being disposed in pairs, each row of large pieces being united by a zig-zag suture with another of a similar description, there are in reality but five large segments of the shell, each supporting a double row of tubercles. Nor are these the only parts to which spines are affixed, a vast number, though of secondary importance, being disseminated over the surface.* In addition to the plates supporting the tubercles, there are a number of ambulacral bands which support the myriads of suckers protruded after the manner of the Starfishes. “In a moderate sized Urchin,” Forbes tells us,† “he reckoned sixty-two rows of pores in each of the ten avenues.” Now as there are three pairs of pores in each row, their number multiplied by six, and again by ten, would give the great number of 3,720 pores; but as each sucker occupies a pair of pores, the number of suckers would be only half that amount, or 1,860. In other parts its structure is not less complicated,—there are above three hundred plates of one kind, and nearly as many of another, all dovetailing together with the greatest nicety and regularity, bearing on their surfaces above 4,000 spines, each perfect in itself, of a complicated structure, and having a free movement in its socket.‡

* British Star Fishes, p. 152.

† “The Spines are at first immovable, and stand out like processes from the tubercles; the joint is not developed until after they have acquired a certain size.” Owen’s Comparative Anatomy, Invertebratæ,” p. 201.

We now come to the "Caves," which are the "lions" in this part of the country;—we enter the first, which has a double opening, high, but not particularly deep;—here, much to the joy of our party, we find magnificent groups of *Purpuræ* and *Haliotideæ* (Ear Shells), and we were soon all on our knees intent in admiration of them, calling down vengeance on some irreverent beings who had been hacking and hewing away and mutilating many splendid specimens, without, as we could perceive, obtaining one entire. The *Haliotis* is a flat, brick-dust coloured shell, so similar in shape to the human ear that it is commonly known as the *Ear Shell*; and the generic name given above is composed of two Greek words having a similar signification. The natives call it *Munja*, or big-mouthed. The aperture is nearly as large as the shell itself, one end being slightly spiral, and from the spire to the other extremity is a row of holes, for the passage of the animal's mantle, which are made at regular intervals as it increases in size, the one nearest the spire closing up as each new one is formed, leaving seven or eight generally open; the interior of the shell is beautifully iridescent, and in much request for inlaying purposes. The animal itself is exceedingly worthy of attention, its head and side-lobes being fringed or festooned. The natives of the South Sea use the shell to ornament their boats, and to make some kind of musical instrument,—the thick portions of the lip are also formed into fish hooks. Mr. Swainson * corrects a remark

* Proceedings Royal Society of Van Diemen's Land, Vol. 3, part 1, January, 1855, page 46.

of Mr. Reeves in his Monograph on this genus, that "It is a curious circumstance in the Geography of the *Haliotideæ*, that few, if any, are to be found where *Chitons* (Boat Shell) abound, as if they exchanged places to a certain extent in the two hemispheres;" and we have found as he has, that both these genera do inhabit not only the same latitudes, but almost precisely the same localities, the *Chitons* being common in the rock pools on the coast, the *Haliotideæ* remaining only in deeper water, feeding occasionally on shore vegetation.

The author of the "*Curiosities of Food*," mentions that the natives of most of the islands in the Chinese seas dry the soft parts of a species of this animal as an article of food.

It is here may be found, in some of the deep holes, that singular creature called the *Pagurus*, or Hermit Crab, from its invariably inhabiting the empty shells of some of the *Mollusca*; the body and tail are wanting the usual shelly covering, or possess it but in a rudimentary state, and have only a membranous bag for their protection. We well remember the surprise we felt on first beholding a specimen of this strange Crustacean which had been captured by a gentleman whilst Cray-fishing somewhere in this locality, and we were at first inclined to think it was undergoing the process of the periodical moult, after the habit of its kind, the new shell being only in a semi-developed state, but a careful search subsequently along the sea-shore revealed numerous individuals in the same rudimentary condition, ensconced generally in the water-worn habitation of the *Fusus*, or Spindle-shell,

with in all the instances we observed, the protruded claw considerably longer and larger than the other, yet this may not be a permanent characteristic of the species.

So perfect is everything which has been created, that we naturally ask ourselves the question, how may this seeming defect be accounted for; was the crab so created originally, or has this practice (as Mr. Lewes suggests*) resorted to at the outset as a temporary refuge from more powerful enemies, now become an organised tendency in the species? It is not easy to conjecture, but we incline to the opinion of Mr. Kirby,† that this singular form and habitation enables these uncouth animals to prey on creatures, which were they to wear the livery of their own tribe would be on their guard and escape them. We find too, that to adapt themselves thoroughly to their dwelling place, what in other species would be the tail, is in them transformed into an apparatus by which a firmer grip of it is obtained, and so carried more easily along whenever they take their walks abroad for pleasure or from necessity.

Whilst groping about in shallow water not many days since for the green *Algæ* which grow attached to the rocks, an object moving freely about,—apparently vegetable,—arrested our attention; it was speedily captured and taken home *inter alia*, but so thickly was it covered with small fragments of red *Algæ*, and the violet colored zoophyte, *Catenicella aurita*, that it required long and very careful examination before we

* "Seaside Studies," page 47.

† "History, Habits, and Instincts of Animals." Bridg. Treat.

discovered that it was a small crab, which had evidently so disguised itself the better to obtain its prey. We were unable at the time to refer to our books to decide the species which had adopted this plan, and rapid decomposition set in subsequently, so that to this moment we remain in ignorance; but a writer of a paper in Volume 8 of the "Naturalist," (1858, page 7), called "Notes on Crustaceans," mentions having observed this peculiarity in crabs of the genus *Hyas*; and in one instance he was amused at seeing a fine fellow stalking along with all the majesty which borrowed plumes often produce;—it was in a large deep pool round the edge of which abrupt rocks stood, one affording a shelter for some very fine tufts of *Delesseria sanguinea*, amongst which he had established himself; but noticing, no doubt, that the color of his shell was an unpleasing contrast to the handsome weed, he proceeded to array himself with small bits of the extremity of the frond, which he detached, and stuck upon his carapace in an extremely irregular manner, giving him a most ludicrous appearance. This author had another opportunity of observing this process in a specimen which he had in his Aquarium.

But we should not omit to say a few words of the Birds of the Sea-shore, since they tend so much to our enlivenment—we could not forget them if we would: there are first the Gulls, ever restless, screaming their shrill note now just over our heads, and anon flying far out to sea in search of food, in the choice of which they do not seem very particular, preying greedily upon Fishes, Crustacea, Mollusca, and almost any

carcase which is floating. When in search of food they sustain themselves, as many of our readers may have observed, by a quivering motion of the wings, now and then touching the water with their feet,—they swim well but cannot dive: then we have that splendid fellow the Swallow-tailed Tern, with his long red bill, jet black pate, and pale dove-colored wings, darting down into the sea after his prey with unerring accuracy and the rapidity of an arrow. Tripping nimbly along to the water's edge is the elegant little Dotterel, one of the most graceful of our sea-shore birds, and occasionally the Penguin will glide out from shelter of some seaweed bank; the Ibis is a common visitor to the Hopkins, as is also the splendid Australian Pelican, whose wings expand to a width of eight feet; the White-headed Fish-hawk or Osprey too may often be seen lurking about the rocks, feeding on some fine fish, captured by means of his spine-covered feet; the Cormorant frequents the rivers near the sea, and it will afford the sea-side stroller much and lasting pleasure to carefully watch the habits of any one of them, which he may easily do by concealing himself behind any low scrub or rock that presents itself.



CHAPTER VI.

"Of gay and curious shells
Corallines and fresh seaweeds spreading forth their
delicate branches."

BUT we must not forget that other parts of the coast demand our attention now, for although we prefer the bracing breezes of Warrnambool, there are many who run down from the hot streets of Melbourne to spend a few days or weeks in the quietude of Geelong, for gloomy though it may appear to some, the searcher after a knowledge of Marine objects will find plenty that is novel, much that will interest him in Corio Bay. "However dull," says Edward Forbes, "a country may seem, however uninteresting its human population, the creatures that live on its surface, or swarm amid the waves that wash its shores, afford a constant and inexhaustible source of amazement and instruction. The Naturalist is at home everywhere, and finds a museum where the ordinary voyager sees nothing but a waste. In the Polar regions he is intensely happy, but in the tropics he is in Paradise itself. No district is so poor and barren, but it has treasures for him, and none so rich, but that all its gold would fail to prevent his rushing after a new butterfly, or climbing the rocks after a new flower."* To impress this fact on our readers is the aim of these pages, which will we trust assure them that there is much to be learned,

* "The Naturalist at Home and Abroad."—Forbes.

—great happiness in store for those who will follow our advice. To be at the Sea-side without some occupation is one of the dreariest things which can fall to a man's lot,—by occupation let it be remembered we do not mean the abominable pastime,—novel-reading,—so often indulged in, and called recreation, but that in which the mind can participate and be prevented from falling into that listless state which too often succeeds a season of idleness and desuetude.

A more beautiful little Bay than this can scarcely be imagined,—a perfect basin surrounded by high bluffs on the town side, above which are the Botanical Gardens, and over the water, in the back ground, are the pretty Anakies to complete the landscape. Here the sea is ever calm, and seldom disturbed by the huge waves and bleak winds which form so unpleasant a feature at other parts of the coast. This now is a piping hot day, so we are glad enough to leave the dusty streets to embrace any stray puff of wind lurking about. The Shore birds are silent enough; but see how the water birds are sporting about in the greatest enjoyment, perpetually turning over and over in the water, now diving and only raising their bills just above the surface to breathe, their bodies still remaining submerged. How we envy them as we pant here, shrivelled up almost by the sun's rays. The Bird Bank across the Bay is covered with Pelicans, their bills pressed down on their breasts, Gulls, and Cormorants,—the latter have a loose piece of skin under the throat, but not as is the case with the Pelicans, for storing their food, but rather to admit of

their swallow being extended when meeting with some tit-bit rather larger than usual ; we expect they are pretty well gorged now from the indifference with which they regard us, and our endeavours to get them on the wing. There too in addition to the White Ibis and the Dotterel, which we have mentioned previously as frequenting the Warrnambool Coast, we have the Sooty Oyster Catcher, (*Hæmotopus fuliginosus*) from Lake Connemara, and the delicate Greenshank (*Glottis glottoides*.) We can scarcely particularise the species of Ducks which occasionally wheel over our heads as we progress, but we have seen near the Lakes, the Mountain, the Black, the Teal, the pretty pink-eyed (*Malacorhynchus membranaceus*) (Sow,) the Shoveler, and many more. Look through this glass now at that group of silvery-breasted Grebes (*Podiceps*) gliding along the surface of the water as they alight ; out of the water they are (except on the wing) perfectly helpless, only standing with great difficulty ; but once in their own natural element, their broad oar-like lobed feet enable them to swim and dive with great facility ; a specimen of the lesser Grebe ornaments our shelves, presented by a friend who had picked it up under the light-house at Queenscliff, against which it had flown, and by its side, standing about nineteen inches high is the very beautiful Stone Curlew, (*Edicnemus grallarius*), whose brilliant dark markings looming out from its light cinereous plumage, render it a prize to the Ornithologist,—let him look for it here !!

But to work, yet let us first remark to our readers, (as we should have done earlier), no matter of what

sex they be, that searchers after sea-side treasures must not regard their personal appearance, nor hesitate to adorn themselves with the paraphernalia of the craft in the shape of sundry sized "billies," or tin cans, suspended on a strap or string, for collecting; a hammer, such as is used by Geologists, is indispensable—one end tapering to a fine point, the other blunt, and let the handle be tolerably long and well seasoned; a cold chisel is often of very great assistance, and a small muslin net made so as to fasten to a walking stick is the most useful instrument the Sea-side collector or diver into Ocean's mysteries can employ; wet feet, as a matter of course, will fall to our lot, but no matter so long as we keep moving and the spoil is plentiful. The rocks just left dry by the retreating tide, with here and there a few very shallow pools we will search first; Tops (*Trochi*), *Cerithium*, *Natica*, and the brilliantly-colored bivalves *Aviculæ*, are in profusion;—taking up the stones, one by one, we meet with so many interesting forms that we must needs be moderate in our gatherings or our pots will soon be overcrowded,—it is well therefore to select only such as cannot easily be obtained at any other time, leaving the more common to be collected as leisure offers;—to arrive home after a day's fag on the rocks, to reach which we may have had a preparatory row, or a tedious walk on a soft sandy beach, with hosts of creatures to "bed and board," which to do successfully inculcates some acquaintance with the habits of each, is indeed a bore, and likely to damp the ardour of even the most enthusiastic of our readers. Strolling quietly along "improving" (we

hope) "the shining hour," by recounting past experiences, we turn over those stones under which it is probable what we are in search of may be lurking;—for a time we are unsuccessful, but at last our zeal meets with its reward. We find a thin flat ribbon-shaped gelatinous creature of a dirty white colour, writhing about into all manner of crevices to prevent its being detached, twisting itself into curious shapes, but always adhering so tenaciously to the rock, that it is scarcely possible to remove it without mutilation;—however, Naturalists have a certain amount of perseverance, and done will we never be, so at last when the patience of our companions is well nigh exhausted, we have a specimen fairly bottled. But what is this creature, do you ask? One glance through our pocket lens, shows us it is a *Planaria*—we know it at once from its Hydatid appearance. Under the higher powers of a microscope the digestive apparatus is well worthy of examination, it will be found to be arborescent, the nutritive juices being dispersed along the sides of the animal. These creatures, though belonging to the *Entozoa* (internal parasites), are not parasitic, but creep about on the *Confervæ* and *Algæ*, found in situations similar to those we are now working in. The small specks on the anterior part of the body, have been said to be eyes, but Rymer Jones* thinks their claim to such an appellation not only unsubstantiated, but actually "negatived by experiments," which go to prove that in the pursuit of prey, no power of detecting the proximity of their food by the exercise of sight is possessed by any of them. Be

* "Animal Kingdom," page 147.

this as it may, we secure a few specimens to mount for the Microscope, and again to work;* away wriggle ere we can lay hands on them, myriads of the small pink *Nereis*, not very unlike the Centipede in appearance, having legs regularly disposed on each of the numerous segments of which its body consists, but belonging, as will readily be seen, to the *Annelida*, a class named from *Anellus* (a small ring), in which are comprised creatures whose bodies are composed of a succession of rings, the leech and common earthworm being familiar illustrations, but there is even yet a more interesting type which inhabits those small elongated tubes which are so abundant in low water on this beach; these tubes are apparently made of grains of sand, particles of which, from being waterworn, shine out like diamonds, and are cemented together by some substance (what it is we know not) which exudes from the body of its occupant, a *Terebella* belonging to the division *Tubicola* of Cuvier. Our own experience enables us to confirm the remark of Mr. Lewes, that "Amateurs are not fond of Worms," but the peculiar structure of some of them, the beauty of their tentacles when expanded (in *Terebellæ* or *Serpulæ* for instance), demand careful examination from those having a love for Natural History. The Keeper of one of the bathing houses here has lately exhibited to the frequenters of his establishment a tiny impromptu Aquarium, in which, amidst other things, were groups of *Serpulæ*, whose tentacles carefully expanded when everything

* There are also terrestrial *Planariæ*, no less than 12 species of which Darwin (Nat. Voy., p. 27), speaks as having found in different parts of the Southern Hemisphere, some obtained in Van Diemen's Land being kept alive for nearly two months on rotten wood.

around was quiet, were withdrawn with great rapidity on their being touched or otherwise disturbed.

The wonderful process of the *Terebella* multiplying itself by gemmation, described in such a spirited manner in the "Sea-side Studies, (page 61,) is far too interesting not to find a place in our Work;—it is quite a new feature in its history, although it has been long known to occur in nearly allied *Annelida*, the tail of the *Nereis*, for instance, being still the tail of its offspring, and however often the body may divide, still the same tail remains attached to the hinder portion, so that this part of the animal may be said to enjoy a kind of immunity from death.* "When," says Lewes, "the animal (*Terebella*) reproduces by this budding process, it begins to form a second head near the extremity of its body. After this head, other segments are in turn developed; the tail or final segment being the identical tail of the mother, but pushed forward by the young segments, and now belonging to the child, and only vicariously to the mother. In this state we have two worms and one tail. It is as if a head were suddenly to be developed out of your lumbar vertebræ, yet still remain attached to the column, and thus produce a double-headed monster, more fantastic than fable; or suppose you were to cut a caterpillar in half, fashion a head for the tail half, and then fasten this head to the cut end of the other half—this would give you an instance of the *Syllis* budding. But in some worms the process does not stop here. What the mother did, the child does, and you may see at last six worms forming one

* Rymer Jones, *Animal Kingdom*, page 312.

continuous line, with only one tail for the six. The tail indeed is the family inheritance, but reversing the laws of primogeniture, it always descends to the youngest; like that elaborate display of baby linen which was worked with such fondness for the first-born, and has become in turns the costume of successive pledges as they appeared on this scene of life with a constant *diminendo* of interest in all but parental eyes. The separation finally takes place, and then we perceive the children and grand-children are not quite the same as their ancestor." As we have before mentioned, the fact had not hitherto been observed in the group *Tubicola*, (or animal flowers), yet two of our author's *Terebellæ* gave him a sight of it. "The first," he tells us, "died before the separation took place; the second, after a day or two's captivity, separated itself from its appendix of a baby, and seemed all the livelier for the loss of a juvenile which had been literally in that condition of 'hanging to its mother's tail,' which I have heard applied in metaphorical sarcasm to small boys anxious to be with their mothers. The young one only lived four days." We need not apologise for this long extract, it is the most graphic description we have met with for many a day, and we only wish we could follow out the author's learned arguments in confirmation of the experiments of Bonnet and M. Peltier.

But what means that piteous cry from our companion on a-head who is wading about sans shoes, sans stockings? Has a monster Poulpe taken fancy to his posterior extremities, or has some daring young Mollusk, caught in the act of showing her pretty foot,

retained one of his fingers in her grasp (he is a bachelor) as she closes her habitation? We hurry to the rescue, but he has only stepped on "*this nasty thing*," we discover, and he holds it up to us with a derisive look, as much as to say, "catch me beach-combing any more!!" but it is a prize indeed which has caused him this alarm, a Crustacean, very unlike the Lobsters and Crabs generally met with; it is the *Ibacus Peronii* of Leach, and belongs to an order of Macrourous Decapods (*Scyllarideæ*), or in plainer terms, long-tailed, ten-footed Crustaceans,—feet all of equal length. When full grown it measures about five inches, the carapace much wider than it is long, with a lamellar prolongation on each side which covers the feet. The eyes instead of being situated near the external angle of the carapace are far distant from it. The abdomen is short, suddenly narrowed from before, backwards. It is commonly known as the "Kangaroo Crab," from a habit of striking the water with its flabelliform tail, and bounding into the air, and with the same apparatus it swims rapidly—it being, as in many other Crustaceans, specially constructed for that purpose. Our bathing-house acquaintance has captured many fine specimens, of one of which a sketch is given at the end of this chapter.

Swimming about occasionally amongst the seaweeds the pretty *Syngnathus* may be met with;—the common name of Pipe-fish it receives from its tubular snout, and long attenuated body: this is the *marsupial fish* which formed the subject of a paper read by Mr. Becker, before the Philosophical Institute of Victoria, (Transactions, Vol. 1, page 14, 1857,) but the fact

that the ova were hatched in a pouch attached to the *male*, had long previously been known, the female transferring them to her Lord and Master who performs all the duties of incubation ;* here alone is an interesting process for the Aquarium keeper to watch. Allied to the Pipe-fish is the Sea Horse (*Hippocampus*) so called from its snout resembling the head of a horse ; it is a great pet, as was instanced by the crowd of persons visiting the bathing-house when a specimen was exhibited there, and will well repay any additional care which the Naturalist may bestow on it. We give elsewhere a sketch of this singular fish, but it must be seen alive before any idea can be formed of its quaint way of poking its snout into all manner of crevices, and twisting its tail around any object which may present itself ; pity that we cannot convey to our readers the beautiful rapid rotatory motion of the dorsal fin, not unaptly compared to the screw of a steamer. The Male *Hippocampi* like the Pipe fishes take an active part in the reproductive economy.

Let not our readers rashly venture into the water here, for the fish-stall of Mr. Baker, in Malop-street, has revealed to us that such things as Tiger and Ground Sharks of most uncomfortable dimensions are to be met with, still much may be gained by carefully turning over the rubbish washed up by the tide. Seaweeds are seldom met with, if we except the beautiful olive *Sargassum*, with its broad oak-shaped sinuate leaves, and the grape like brown clusters of the *Hormosira Banksii*, in all its several forms, so carefully figured by Professor Harvey in his History of the Seaweeds

* Proceedings Zoological Society, 1834, p. 118.

of Australia ; the Jelly fishes always abound, but are generally in a state of decomposition, and the slug-like creatures from the touch of which one almost shrinks, are worthy of more attention than we are at first inclined to give them. It will astound some of our readers to hear that these slimy creatures (*Holothuria*, or Sea Cucumbers,) belong to the same division as the Starfishes and Sea-eggs, and like them have suckers, varying perhaps in different species, by which progression is effected, and for plumose tentacles they have the most beautiful that can be imagined. There is one habit however they have, which is more singular than pleasant,—the getting rid of their intestines whenever handled. Forbes does not think this is the case, but our own experience confirms the statements of other writers, and Rymer Jones gives as a reason, that “the slightest irritation applied to the surface of the body causes such powerful contractions of the integument that the thin membranes of the cloaca unable to withstand the pressure, become lacerated, and large portions of the intestine and other viscera are forced from the anal aperture.” Sir John Dalyell however states that they have the power of reproducing the alimentary canal.

For the mode of manufacturing these creatures into a substance much used by the Chinese, and called “*trepang*,” we must refer to the “Curiosities of Food,” a work of much interest, not long since brought out by Mr. Simmonds, remarking only that a large quantity is annually exported, we believe, from Northern Australia, and only a few years since a Company was started in Western Australia for carrying out this

Fishery, but its operations were limited during the brief period of its existence.

But the rapidly rising tide puts an end to further exploration for to-day,—we have scarcely lost sight of the Town—so panoramic in its appearance—and yet we have had occupation enough, and our collecting bottles are full, so leaving our companions to rest awhile to sniff the evening breezes in quietude, we saunter homewards, recruited in health and spirits, and infinitely the wiser for our intercourse with Nature, cordially agreeing too with Bryant that—

“ To him who in the love of Nature holds
Communion with her visible forms, she speaks
A various language ; for his gayer hours
She has a voice of gladness and a smile,
And eloquence of Beauty, and she glides
Into her darker musings with a mild
And healing sympathy that steals away
Their sharpness ere he is aware.”



CHAPTER VII.

" ——— All is barren !
 Why so it is, and so is all the world
 To him who will not taste the fruit it offers."

How fully replete with pleasant thoughts is the memory of our wanderings along the shores of Hobson's Bay, by St. Kilda and Brighton, accompanied by a chosen friend, whose pursuits though not quite identical with our own, were sufficiently akin to admit of our entering into them with a zest but little less than that which he professed,—he ever and again rushing frantically away after some one of the many

" Little bright-eyed things
 That float about the air on azure wings."

and returning breathless after a while to exhibit his spoil, *in re Lepidoptera* or *Coleoptera*, whilst we, not to be outdone, displayed to his wondering sight the many handsome forms, animal and vegetable, which had found their way into our collecting pouch and bottles. There is an intense charm in having a companion on these excursions, one really devoted to the work, and ready for any thing that may turn up, and moreover, social converse, the application of two heads to any debatable point, and skilled assistance when needed, are wonderful helps to such work as ours.

What adds so very materially to the beauty of this part of the coast is the very many lowly shrubs rooted deep down in the sandy soil, such as the yellow *Hibber-*

tias, the silky *Pleurandra*, many species of *Geranium*, the lovely pink and white *Epacris* or Native Heath, the bitter *Erythræa australis* and others, whilst in moist places such as the banks of the lagoons trail the tiny *Lobelia* and the *Myoporum*, with its refreshingly green, shining, spatulate leaves, and then coming to St. Kilda, we wander through dense bushes of the beautiful white-flowering *Riccinocarpus sidaeformis*. It is well to pause awhile here, were it only to observe the constant arrival and departure of vessels from all parts of our own coasts, and from every quarter of the globe, whilst the Bay itself is thronged with ships more in number than perhaps any other port in the world can boast of ;—truly the progress of this Colony is a matter for wonder, when we reflect that but some twenty-five years since, the bold pioneers slowly wound their way up the Yarra, and laid the foundation of the handsome, densely-populated City of Melbourne, yet in the stirring scenes which have passed panorama-like before us, since the gold discovery, the energies and indomitable perseverance of those men have scarcely even been a matter for a passing thought ; the time is yet to come when we shall duly appreciate them, and the dangers they have past will be as familiar to the Colonists at large as “ Household Words,” more particularly if some enterprising Publisher would give us cheap editions of the Travels of Batman, Mitchell, Sturt, poor Leichardt, and a host of others. We eagerly devour the last new novel, and the discoveries in and histories of other lands, but to our shame be it spoken are singularly apathetic to a knowledge of that in and by which we live.

But we have arrived at a part of the beach sufficiently undisturbed to admit of our commencing operations, and we arrange in our coat of many pockets the various bottles,—large and small,—which we hope to fill by and by ; this is apparently a trivial matter, but take our word for it, some such methodical arrangement often facilitates the securing a rare specimen, which otherwise would wriggle away whilst the peculiar bottle to suit it was being ferretted out.

Here now we have one of the *Cephalopoda*, so called as we have previously informed our readers, because the only organs it has, which can be compared to feet, are attached to the head, and are employed in ministering to the mouth, and pretty actively they minister too !!

In the *Octopus* (the name of the specimen we have captured) there are eight of these feet,—as may be implied by its generic title, but in the Decapods, as the Cuttle-fish (*Sepia*) or Squid (*Loligo*) there are in addition two long tentacles which not only serve to capture prey beyond the reach of their true feet, but to anchor themselves by when the seas are agitated. The Chinese fishermen on our shores dry these for food, and we have often been astounded at the vast numbers which are, day after day, drying around their establishments. In the former, the shell is but rudimentary, and the only approach to a skeleton is a cartilaginous ring, whilst in the *Sepia* it is large, and in the Squid or Calamary, as it is often called, it is reduced to a horny or quill-shaped plate, and of both we have frequent examples on our shores. The feet are flexible and muscular to a high degree. Along each edge of

the inner surface, which is flattish, while the outer is rounded, is a row of circular sucking discs, amounting in number to upwards of one hundred in each foot ; once let these suckers get a firm hold of anything that is worth retaining, and farewell to all hope or chance of its ever getting free, so long as their owner pleases to operate on his prey with these perfect cupping glasses. Examine any one of them, says Rymer Jones,* "It is an admirably arranged pneumatic apparatus—an air-pump. The adhesive disc is composed of a muscular membrane, its circumference being thick and fleshy, and in many species (the Decapods, or ten-armed) supported by a cartilaginous circlet, so that it can be applied most accurately to any foreign body. In the centre of the fleshy membrane is an aperture leading into a deep cavity, at the bottom of which is placed a prominent piston that may be retracted by muscular fibres provided for the purpose. No sooner therefore is the circumference of the disc placed in close and air-tight contact with the surface of an object, than the muscular piston is strongly drawn inwards, and a vacuum being thus produced, the adhesion of the sucker is rendered as firm as mechanism could make it."

The ten footed Cephalopoda or Decapods have a pair of fins by which they swim in all directions, but the broad web connecting the feet of the Octopods enables them to swim in a retrograde direction, a peculiarity we but recently noticed in a specimen kept for our observation by the Keeper of the bathing houses at Geelong (Mr. Rigney), and in our investi-

* Structure of the Animal Kingdom, p. 558.

gation of its habits we became acquainted with a peculiarity which it in common with other Cephalopods possesses, viz., of changing its color, Chameleon like, to harmonise with the surface on which it rests, blue, brown, and pale pink being displayed according to circumstances, the blue and pink being retained in the animal, now some time in spirits before us as we write.

The mouth of the Cephalopoda is singularly formidable,—it is armed with a pair of powerful horny jaws, having within them a fleshy tongue, the whole apparatus being not unlike the bill and mouth of a parrot, forming, as may readily be imagined, most destructive instruments amongst the young crustaceous and testaceous animals on which they prey at the bottom of the ocean, where by day they establish themselves, but roaming gregariously after nightfall. The *Octopus*, many will be aware, is the animal fabulised under the name of the “Kraken,” and formerly thought to have such size and power as to qualify it for attacking shipping, and most wonderful stories are told by nautical men of its bulk and strength. It is in fact as a friend remarks to us the Sea-serpent of the old, as the Gulf-weed, has been that of the modern maresnesters.

And not only have these creatures such formidable weapons of offence, but they are provided with means equally efficacious for defence; we have heard of impudent cases of theft being committed, snuff having first been thrown into the eyes of the victim, but these animals possess a bag containing a dark inky secretion which can be ejected at will, either to favor their escape from foes, or to enable them to carry out certain

designs more artfully and successfully under the protection which it affords. That charming writer on Zoology, Mr. Broderip, attempted with a hand-net to catch an *Octopus* that was floating by with its long and flexible arms entwined round a fish, which it was tearing with its sharp hawk's bill; it allowed the net to approach within a short distance before it relinquished its prey, when, in an instant, it relaxed its thousand suckers, exploded its inky ammunition, and rapidly retreated under cover of the cloud which it had occasioned, by rapid and vigorous strokes of its circular web.*

An amusing anecdote is also told of a gallant Officer who was inconsiderately collecting shells in a pair of immaculate white trousers, and came suddenly upon one of the naked Cephalopods snugly harboured in a recess in the rock. They looked at each other, and the cuttle, who had his eyes about him and knew well how to use them, upon seeing the enemy advance took good aim, and shot so true, that he covered the snowy inexpressibles with the contents of his ink-bag, and rendered them unpresentable either in drawing-room or dining-room.†

Pocketing our Octopus after this long yarn about him and his fellows, we stroll onwards to a heap of Seaweeds, evidently thrown out from the Fishermen's net, and soon were on our knees groping amongst it, when a loud snort made us rise somewhat hastily (visions of mighty *Krakens*, enveloping us in their huge arms, flitting lightening-like before us), and then

* Lectures, Comp. Anat. Invert. Owen, p. 611.

† English Cyclo. Nat. Hist. Sect., Article *Sepiæda*.

discovered, what in our eagerness had escaped notice, that we were kneeling on the tail of a huge Sting-Ray, which had by this means testified his displeasure at our freedom with his extremities,—dangerous quarters with such formidable spines as he possesses there. We wished to make closer acquaintance with him, and remove him out of our path, but a renewal of this loud snort was all the welcome we obtained, and so leaving him to his fate we resumed our algologising.

Of the Seaweeds we collect here we shall speak in their proper place;—it is of the many beautiful Zoophytes growing on them with such plant-like form and stillness, that we must now direct the attention of our fellow rambles. What are Zoophytes? Well, without entering into the nice distinctions between what is animal and vegetable, that having received the attention of abler hands, we may notice some of their various forms,—the *Anemones* are Zoophytes, and the most commonly known probably, but let us examine together the ribbony Kelp fronds on the beach,—we need not search long before many little silvery spots of the size of a threepenny piece are pretty sure to arrest our attention,—admire them you will we know, but look at one through a pocket lens, and thousands of pearly cells will be observed, each having a distinct aperture, uniform in appearance;—it will scarcely be credited that each and every one of these forms the habitation of an animal!! sensible to outward impressions, stretching forth its tentacles in search of prey, and performing the functions of digestion through all its various stages. This is what we see in a species of *Membranipora*, and not an uncommon one;

there are many others on our coast, presenting a variety of forms which Art would fail to imitate ; the *Plumularias* and *Sertularias* resembling small bushes, must contain some tens of thousands of Polypes on each bush,—the *Plumularias* have polyp cells on one side only of the branch, the *Sertularias* on both ;—some, as the *Campanularias*, creep closely to old shells and seaweeds, jointed at regular intervals, the joints being ringed, and throwing out pretty campanulate cells ; others as *Aetea*, winding along seaweeds, such as *Ballia* and *Callithamnion*, and resembling the head of a snake without its lower jaw, from which cause the genus was called by Lamarck *Anguinaria* (*Anguis*—a Snake), but the former appellation bestowed upon it by Lamouroux, has again been generally adopted : in a common Victorian species (*dilitata*), specimens of which the Rev. Dr. Landsborough in his manual of the British Zoophytes, mentions as having received from his and our esteemed friend Dr. Daniel Curdie, of Tandarook, Camperdown, the head instead of terminating like that of a serpent, is shaped like a ladle ; the *Lepraliæ* or Sea-scurf are abundant enough on rocks and stones, and most puzzling the student will find them ; then there is the *Serialaria* or Nit Coralline, not a pleasant object to the naked eye, but under the microscope displaying its cells, disposed in rows at intervals, so as to resemble Pan-pipes, whilst in another species (*convoluta*) they are whorled.

The *Catenicella* is widely distributed in the Australian Seas, each cell divided by a short corneous tube, and variously marked with fenestræ or vittæ ; almost every collection of Algæ will afford some

species, all well worthy of careful study, but to enumerate the charms of one quarter of them would occupy more of our space than we can consistently afford them. Those who will collect them, will by getting a few leading ones named to serve as types, very soon master the most common species, and will find too much that will assist them in Landsborough's very pretty Book, to which we have before alluded, "The British Zoophytes," by Johnston, the very excellent Catalogue by Mr. Busk, of the Zoophytes in the British Museum, with most carefully drawn plates, which supplemented by the papers * but lately read before the Royal Society of Victoria by our much valued friend, Dr. Macgillivray, of Williamstown, will give all our Australian species.

But say some of our companions, "we always fancied these were Seaweeds," nor is this a novel idea, since the very name given to the class—*Zoophyta*—(*Zoon*, an animal, and *phyton*, a plant, owes its origin to the doubts originally entertained by Naturalists as to the true place of the animals comprised in it, in the Natural Kingdom : why even Tournefort and Ray described and arranged them amongst the Seaweeds and Mosses !! In 1599, an Apothecary of Naples, Ferrante Imperato, published his "*Historia Naturale*," wherein he mentioned as the results of his observations,—the *animals* of Corals and Madrepores. Peyssonnel (to whom a genus of Algæ has been dedicated), in the year 1727, had seen the Polypes of Coral and of Madrepores, had witnessed their motions,

* "On some New Australian Polyzoa." 3rd Aug., 1859.

"Notes on the Cheilostomatous Polyzoa of Victoria." 26th Oct., 1859.

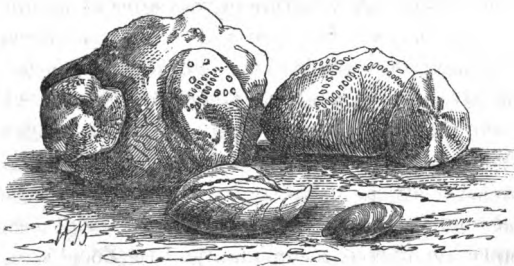
the extension of their tentacles, and the contraction and opening of the oral apertures, and moreover he discovered, what to most minds should have been conclusive, that their corruption exhaled the odour, and their chemical analysis discovered the constituent principles of animal matters; still, when submitted to the Academy of Science at Paris, it was coldly and doubtingly received by the Members. Jussieu, some twenty years subsequently, confirmed the observations of Peyssonnel, and extended his own to *Sertulariæ* and *Flustræ*.

Reaumur also in an able manner reviewed the ground already gone over, and declared in favor of the animality of Zoophytes, and predicted that many then unexamined would have to be added to the list. There were still many disputants on the subject, so loth are men to give up opinions already formed; but a merchant of London, Mr. John Ellis, who was particularly fond of Natural History, and had amused himself with making landscapes of Seaweeds and Corallines (?) on paper, was induced to look more minutely into the structure of the latter by aid of the microscope, and he discovered that these so called Corallines, on examination, indicated more of an Animal than Vegetable nature, an opinion which subsequent investigations fully bore out, and any statement made by Ellis was valuable, since he only detailed facts, *ex visu*, or an inference from them. And so from this time up, in spite of many contradictory hypotheses, the animality of the Zoophytes has been firmly established.

Many of the polypidoms or habitations of the Zoophytes are so minute as only to be accurately discerned under the microscope ;—lucky will the investigator of them be if its powers will reveal the Polyp itself ;—and there are many methods of preparing them for the purpose ;—the *Sertulariæ*, *Plumulariæ*, and similar ones may either be mounted in Canada Balsam, or in distilled water, and the *Flustra*, *Membranipora*, *Lepralia*, *Catenicella*, &c., as opaque objects, gummed down in cells made of dark cardboard, covered with thin glass.

Most earnestly do we recommend our readers not to pass lightly by these many lovely forms of Marine life, such as we have only casually and but faintly depicted here, so sure are we that they will soon exclaim with the Poet—

“ ——— Can such things be,
And overcome us like a Summer's cloud
Without our special wonder ? ”



CHAPTER VIII.

"WHEN I have my books," says that eloquent writer, Jonathan Freke Slingsby, "I have old friends, whose cheering looks make amends for coldness in men;" and we echo his thoughts, for no matter what our toils may have been, mentally or bodily, throughout the day, there is always a quiet hour or so before retiring to rest, which we invariably devote to our books, and it is particularly enjoyable too after a day's rambling, such as is described in our last chapter, when with wearied limbs we draw our chair a trifle nearer to the fire,—for have one we must, and a cigar too, after wading for so many hours,—and acquaint ourselves with the habits of such creatures as may hitherto have been unknown to us, or comparing our own observations on them with those of other writers, our Microscope at our elbow, should any important point have to be cleared up or any specimen require aid to decide its *status* in society.

We had laid aside from our former gatherings, some very lovely specimens of the *Echinodermata*, and we have them now before us for examination. Amongst these *Echinodermata*, or hedgehog—skinned creatures, belonging to the division *Radiata*, we have first the large spiny Starfish, taken from near the bathing houses at Geelong, and a splendid fellow he is, measuring as much as eight inches from the tip of one ray to the extremity of another, each (and he has ten)

bristling with spines on the upper part, and alive with myriads of suckers below. Then we have the true types of this class in the Sea Urchins, or Sea-eggs, covered with spines—purple in colour,—most exquisitely fluted, and with a rim at the base of each regularly crenated. There are few who gather the denuded, *so called* shell of this animal as it is thrown up on our shores, would own the relationship between them. And such jaws as they have, with which our own cannot compare for one moment; here now is a specimen before us from which we have extracted the whole dental apparatus,—it is, to own the truth, the first time we have so carefully observed it. In the living animal merely the five triangular teeth closely fitting together can be noticed, and we were scarcely prepared for the large jaws in which we found them. These jaws are, as the teeth, five in number, and form a five-sided cone, and in a socket passing through each the teeth are imbedded; when examined separately, they are found to resemble in figure a triangular pyramid, the external surface being smooth, with eminences for the attachment of muscles, whilst the other two sides are flat and marked with groovings resembling a very fine file. When fitted together, these grooved flat sides of each jaw are in apposition with the corresponding surface of two others, so that there are in fact ten grinding surfaces formed, between which the food must pass preparatory to its introduction into the digestive canal. The food of the *Echinidæ* consists of shell fish, but in an allied family the *Spatangideæ* or Heart Urchins, some magnificent fossil specimens of which we took some years since from

the cliffs at Portland Bay (p. 60,) there are no teeth, and they subsist on the animal substances contained in the mud on which they feed, and in which they live. There is something intensely grotesque in the habit which some of the Starfishes have, as we already have remarked, of wriggling themselves about until scarcely anything is left, as much as to say, "very well, if you are determined to persecute us, we have made up our minds that you shall have as little for your pains as possible." There is an immense deal of spitefulness in the whole operation. What next, we exclaim? Are we to see a realisation of Forbes' vignette, where an aged *Ophiurus* is leading out one of his own race, of tender years and of different sex, to dance ashore to the music of some water elf or other, comfortably seated on a pookawn—*qui sait*?

But in spite of this propensity, the majority of the Starfishes may be preserved without much difficulty; if brought home in seawater they will expand themselves, and they should then be plunged quickly into a basin of cold fresh water, when they will die so rapidly as not to have time either for consideration, or for breaking themselves into pieces, and Forbes (British Starfishes, p. 32,) recommends that after remaining in this freshwater for an hour or so, they should be dipped, *for an instant only*, into boiling water, and then dried in the sun or a current of air. The Sea Urchins may also be plunged into cold water, (hot loosens their spines), the dental apparatus carefully removed, and the animal disembowelled with the aid of a piece of stick to which a wad of cotton wool is attached, and frequently rinsed until perfectly sweet,

—when so, the jaws may be replaced in a layer of cotton wool.

In turning over the broken fragments of Algæ thrown up in heaps on the coast, we not unfrequently find an oblong, leathery, red, shapeless substance, which will no doubt puzzle some of our readers, as to whether it may be regarded as animal or vegetable ;—take it up and not unlikely you may have a jet of water squirted into your face. Would you believe now that this is one of the *Mollusca*, and of the class *Tunicata*, or Tunic-clad, having, instead of a shelly case to its body, a strong coriaceous covering, with certain orifices—generally two—one branchial, the other anal ? They lead an apathetic kind of life, seldom moving from the stones or seaweeds to which they may have attached themselves, but deriving nourishment from the microscopic creatures contained in the currents of water, which they draw in by means of their ciliated respiratory organs, below which is the mouth ; the stomach according to Woodward, (Manual, p. 336,) contains chiefly minute particles of the articulated seaweeds, and *diatomaceæ*. These animals are not unaptly called “Ascidians,” from *askos*, a flask or skin bottle, and are vulgarly known as “Sea-squirts.” The rocks at the Barwon Heads, left dry by the retreating tide, are covered with them, and no Aquarium should be without a specimen or two.

Whilst sauntering along the beach at Corio Bay a few days since, we noticed a pair of the delicate little Storm Petrels flitting about over the waves, just skimming them, and dipping their tiny feet into the water as they paused awhile to secure the small fishes,

Mollusca, or greasy substances which form their food. These birds, as far as our own observation goes, seldom visit the coast, although probably some of the islands serve as breeding places for them. Those who like ourselves have journeyed hither from other lands, will hail them with a kindly welcome whenever met with, since no matter how boisterous the winds, or how rough the sea, they, ever gay, cheered our long imprisonment on the vasty deep.

But whilst we write, the animals which we had laid aside in a small basin have assumed a very different aspect; the tide being low during our late ramble in the same locality, we had contrived, after exercising a vast deal of forbearance, and making all manner of useless blows with our hammer under water, to detach a very pretty dark-green *Actinia*, and with it another little gem,—its colour, a very pale grey, with lighter stripes; now its tentacles are expanded—very short and white,—remark too the beauty of this other species from the piles at the Bathing house, handsomely marked with malachite tints, and throwing out pure white tentacles, pink tinted at their base; all these can be easily obtained, and will add very materially to the attractiveness of an Aquarium.

When examining a fine specimen of the Jelly Fish (*Rhizostoma*) which the Superintendent of the Bathing house was keeping in a large tub of water, we noticed with surprise under its delicate blue umbrella, many parasitic lice upwards of an inch in length, with four antennæ, the feet terminated by hooks, and the extremity of the abdomen widened out

into a regular caudal fin. Detaching one, it rolled itself up in a manner similar to the Woodlouse (*Oniscus*), and they both belong to the same order, (*Isopoda*—equal footed). Large as many of the Jelly Fishes are, the quantity of solid matter which they contain is wonderfully insignificant, and they rapidly become deliquescent on exposure to atmospheric influences, so that we can only liken the chances of good fare which parasites on them entertain, to the Chinamen, who were observed by a friend somewhere in the Chinese Seas, making most persevering efforts to fry these creatures, and evidently sorely puzzled to find how utterly without success their endeavours were. An *Octopus* was also placed in the same tub with the Jelly Fish, but although the sides were high, and before the water could be reached, several feet of the platform had to be traversed, it managed to effect its escape and regain its native element. Many of its habits displayed a vast amount of apparent cunning, as if it was perfectly aware that we were watching it. Darwin mentions the amusement afforded him by the various arts to escape detection used by an individual to which his attention was directed. "Remaining for a time motionless, it would then stealthily advance an inch or two like a cat after a mouse, sometimes changing its colour : it thus proceeded, till having gained a deeper part, it darted away, leaving a dusky train of ink to hide the hole into which it had crawled." *

Those who are geologically inclined, may spend many a pleasant day in examining the soft argillaceous

* Naturalist's Voyage. p. 7.

mud, of which the cliffs on Corio Bay are composed : it is full of fossil specimens of *Dentalium* or Tooth Shells, curved tubes open at the extremities, and either smooth or striated longitudinally ; splendid *Terebratulæ* (*Waldheimia* probably,) are also there in abundance, some *Pectenidææ*, &c. The *Terebratulæ* are the shells commonly called "Lamp Shells," from the aperture through which the pedicle, whereby the animal attaches itself to submarine objects, passes, having some similarity to the hole which in a lamp admits the wick. A species is figured at page 60, in company with the *Spatangus* from Portland Bay. Microscopists will find a beautiful object in the shell of the *Waldheimia*, and many other *Brachiopoda*.

But we have yet to speak of the Marine Algæ, and the Aquarium, so that our Sea-side chattings must for a while cease ; in all our ramblings in search of the many wonders of Nature we have been forcibly impressed by a vigorous sentence in one of Emerson's Essays, wherein he suggests the advantage which a country life possesses for a powerful mind, over the artificial and curtailed life of cities. He says :—" We know more from Nature than we can at will communicate. Its light flows into the mind evermore, and we forget its presence. The poet, the orator, bred in the woods, whose senses have been nourished by their fair and appeasing changes, year after year, without design, and without heed, shall not lose their lesson altogether, in the roar of cities or the broil of politics. Long hereafter, amidst agitation and terror in National Councils,—in the hour of revolution,—the solemn images shall re-appear in their morning lustre, as fit

symbols and words of the thoughts which the passing events shall awaken. At the call of a noble sentiment, again the woods wave, the pines murmur, the river rolls and shines, and the cattle low upon the mountains as he saw and heard them in infancy."

• May the Sea-side rambles we have enjoyed together be the means of lightening our hearts here and hereafter, —truly the oftener we wander on the shores of our vast seas, the more diversified our investigations, shall we have reason indeed to own that—

*
"Things innumerable, both small and great are there."



CHAPTER IX.

THE AQUARIUM.

THERE is something highly satisfactory to the Naturalist in the reflection that science has taken rapid strides within but a few years, and in no department more so than in Marine Zoology,—here, where but a brief period back all was little better than conjectural, there is now ocular demonstration, not only of the many creatures inhabiting the ocean, the one dependent on the other, but also of their habits, minute structure, and mode of living. From our childhood up we had been accustomed to see and have Gold and Silver Fishes in globular glass bowls, but the pleasure was in almost every case a temporary one, the inhabitants dying from the exhaustion of that free oxygen which had existed in the water, but which had all been absorbed, and its place taken by carbon,—before a fresh supply could be given by renewing the water. Collectors have long had their glass bottles wherein to convey to their study such creatures as they desired more nearly to cultivate the acquaintance of, but here too the duration of life was but brief, and soon they had to be transferred to a bottle of Goadby if their preservation was an object. No wonder then that it became a matter of such importance to obtain the means of preserving in health and brilliancy of colour such creatures as we wished to cultivate, and with whose economy we were almost entirely unacquainted. How

this could be achieved, was a matter for long and untiring experiments and trials and repeated failures. But Chemistry was at last applied to the case, and instead of the troublesome operation of perpetually changing the water, ever in dread that a case similar to that we have quoted above might occur, the long sought end was attained; by what is called *compensation*, animals may be kept alive for an indefinite period,—viz.: by thoroughly understanding the relations between animal and vegetable life on the principles of Priestley, followed up by Ingenhous, and finally adapted to the present purpose by Mr. Ward, the inventor of the glass cases which bear his name, Johnston, the learned author of *Histories of the "British Zoophytes," "Sponges," &c.,* Warrington and Gosse. It was Mr. Bowerbank, however, who gave the hint to the Secretary of the Regent's Park Gardens, from which arose the beautiful tanks which are now in full operation there. We have often before had this process of respiratory interchange explained, but who has brought it so vividly before us, as our often quoted friend and companion (his charming writings have made him so,) Mr. Lewes. "Let us stand apart," he says, "and contemplate this marvel no longer as an animal function, but rather as a planetary phenomenon; let us endeavour to picture to ourselves the silent creative activity everywhere dependent on this interchange. The forests, the prairies, the meadows, the cornfields, and gardens,—the mighty expanse of plant-life covering mountain and valley—these subsist on the carbonic acid which is exhaled from the lungs and bodies of animals.

Plants take up this carbonic acid from the atmosphere, mould the carbon into their own substance, and set free the oxygen, once more returning it to the atmosphere. Animals reverse the process, taking up the oxygen, and giving out carbonic acid for the nourishment of plants," and so as Keats beautifully says,—

" Keeping up an interchange of favours
Like good men in the truth of their behaviour."

It is to the want of an acquaintance with these first principles that so many of the failures in attempting to form *Aquaria* may be attributed; the mere filling them with animals will not suffice,—and secondly to an abominable system of overstocking,—specimen after specimen dying from an insufficiency of those gasses which are essential to life.

How this necessary balance may be attained, we shall endeavour to show as we progress,—meanwhile we can go in detail through the various matters required for the establishment of an Aquarium. Its form must depend very much on the taste or caprice of the owner; the square one with glass sides is perhaps the most common, but we question whether it is the most desirable, for Mr. Warrington has discovered that it is absolutely necessary the sun's light should fall directly from the surface on those *Algæ*, which have been removed from the deeper recesses of the ocean, where they were but partially exposed to light, to ornament the tank and afford sustenance to its inhabitants. The tank used by this gentleman is four-sided,—the back and sides being composed of slate,—the back gradually sloping upwards from the

bottom at an angle of 50 degrees. By this plan not only does the light fall directly from the top, but the water more freely absorbs atmospheric air. This object is also attained by staining a portion of the glass placed next the light of a sea-green,—a plan adopted successfully by many practical keepers of *Aquaria* in England.

Were we to decide, we should prefer the form suggested by Mr. Shirley Hibberd, in his very concise little Work on the “Aquarium,” viz., that of the double cube, the length of the tank being just double its width and depth, so that if cut into two equal parts two cubes would be formed. The glass should be set in grooves in the slate, and bound outside with tastefully turned pillars of wood, or any other substance which can easily be obtained or may suit the whim. White lead putty may be used for cementing, but to prevent the water being in any way poisoned by the lead, a coating of shell-lac dissolved in naphtha, and made into a paste with whiting, must be laid over it.

The formers of *Aquaria* are generally in too great a hurry to set their tanks going, but much trouble and very considerable disappointment, not to say expense, (where the party lives away from the seashore, and may have to depend for supplies of stock on some zealous friends, or those, if there are any such, making it a means of livelihood,) would be saved, by allowing water to remain in the tank for several days at a time, changing it occasionally, so as to sweeten the tank before commencing operations,—and even then go gradually to work. First, then, there should be a bottom of good sea-sand (not too finely disintegrated)

and pebbles laid on thickly, as many fishes, Crustaceans, Molluscs, and other creatures love to burrow in it, and besides, it contains a host of minute atoms which will afford sustenance to some one or the other of our pets ;—this layer having well settled down, now comes a matter involving much taste,—the formation of rockwork,—not such fantastical grottoes as we have observed in some Cockney Aquaria, but certain nooks and crannies wherein those which delight in seclusion may ensconce themselves. The shore at Geelong affords abundant material in densely clustered masses of *Serpulæ* adhering to the stones, fragments of which may easily be detached with a good hammer such as we have already described,—this, while ornamental, adds thousands of interesting and graceful inhabitants, whose elegantly fringed ciliæ will be protruded the moment they feel the water, and about St. Kilda and similar places along the coast, scarcely a stone can be taken up that is not covered with the lovely *Lepralia* or Sea-scurf, minute eggs, &c., so it will only require prudent arrangement, without crowding, which in a tank of small dimensions is undesirable, as not only does it render the detection of dead or dying animals a matter of difficulty, but by displacing a certain portion of water, the animals are to some extent robbed of the means by which they should be supported.

When the tank is covered by one of the elegant domed lids which we have occasionally seen, and which we recommend to exclude dust, and to preclude the escape of such creatures as, like ourselves, are given to roaming, the rock-work as we may term it,

may project above the surface of the water, to allow such animals as desire it the means of gratifying themselves. The author of "Ocean Gardens" suggests a kind of double Aquarium, and a contrivance by means of which a large portion of water should flow gradually from one tank to the other at fixed periods, in imitation of the ebb and flow of the tide. Many interesting phenomena he anticipates would thus be exhibited, such as the closing of the Sea Anemones (*Actiniae*) as the water receded, and their expansion on its return;—this change too might be found highly advantageous to the health and development of those animals whose natural habitat lies between high and low water mark, and whose constitution is therefore framed to require entire or partial exposure to the air at certain intervals of time. A pretty idea, which we trust some of our readers may carry out.

Well now, these preliminaries being settled, we may add more water to the tank,—obtained wherever it is possible fresh from the sea, and if at all dirty, filtered through charcoal before being used. Densely populated as seawater is with minute animal life, it must necessarily be more conducive to the success of an Aquarium than that artificially made. Mr. Hibberd argues the question in this way, that in the latter, the very absence of organic matter is advantageous, since the water is less likely to get out of condition than the seawater, where the germs may decay and putrefy, spreading destruction in all directions,—nevertheless, give us seawater with life in as many of its infinitesimal germs as possible. We can by care guard against

casualties, but we cannot always obtain specimens. Yet after all there are many who must resort to this artificial water, and so we give Mr. Gosse's receipt for it ; giving some little hope in the experience of Mr. Hibberd,* that it serves all the purposes admirably, there being no diminution of vigour or beauty in the plants, or of gambolling playfulness in the animals. Strange, however, if such was his opinion in the book from which we have quoted, that only a brief time after in his "Book of the Aquarium," page 59, he states, how quite unsuited for animal life of any kind is this artificial seawater, until it has been brought into condition by means of growing weeds for eight or ten days, and for *Crustaceans, Starfishes, and Fishes proper, it is not suitable till it has been in use for many months, and even then some species lose their health in it, and at last perish.* These, however, are the constituents of the artificial seawater :—

Common Salt, $3\frac{1}{2}$ ounces.
 Epsom Salts, $\frac{1}{4}$ ounce.
 Chloride of Magnesium, 200 grains (troy).
 Chloride of Potassium, 40 " "

or, according to Mr. Hibberd :—

$15\frac{1}{4}$ Quarts Fresh River Water. (beer measure).
 14 Ounces Table Salt. (avoirdupois).
 1 " Epsom Salts. (ditto),
 800 Grains Chloride Magnesium. (troy).
 160 " " Potassium. "

This should be tested by the hydrometer until it reaches a specific gravity of 1.028, being that of seawater.

* Rustic Adornments." page 24.

And now we may enliven the appearance of the Aquarium, by adding some seaweeds preparatory to stocking it with such animals as may be most desirable, —nor is this portion of our operations lightly to be passed over, for on its proper regulation depends almost entirely success or failure. The collection of materials will afford much pleasure and healthy exercise, and when they are flourishing and spreading out their delicate fronds in the waters of our tank, we can recall with delight the rambles we had in search of them.

The green Seaweeds are the most desirable, not only as Dr. Badham remarks on account of their great beauty, but because they do not, like the red or brown kinds, render the water turbid by decomposition, and what a glorious selection we have on these shores!!—the feathery *Bryopsis*, looking under a microscope like spun glass, the ribbonry *Ulva*, the green bullion-shaped tassels of *Codium tomentosum*, fringing the sides of the rock-pools—you will have to bare your arms to reach them,—the many varieties of *Caulerpa*, *Enteromorpha*,—the lovely *Apjohnia latevirens*, which extends along the whole Southern coast,—the glassy *Cladophora*, with a host of others. In the use of Red Algæ, the experimenter must take his chance,—any way he must have many failures; but there is one, the *Griffithsia*, which Dr. Harvey recommends, and there is nothing to compare with it for beauty. The pools about Queenscliff, St. Kilda, Warrnambool, Armstrong's Bay near Port Fairy, Portland, and other of our Sea coasts, will afford abundance of specimens in addition to those already enumerated, which are the best to

commence with, but in no case must they be used unless adhering to the rocks or other substances on which they may be growing, as otherwise they would rapidly decompose and render the water quite unfit for animal life. Some taste too may be used in this matter, for glass bottles, old boots, and sheep's skulls, not unfrequently form the basis of attachment. Olive seaweeds cannot be recommended, although in an *Aquarium*, which we very lately had the pleasure of inspecting, the necklace shaped *Hormosira Banksii*, was the special delight of a dozen or more young and old *Hippocampi* or Sea horses (p. 37), which twisted their tails around its chain-like vesicles, evidently quite at home.

The best test by far of the tank being in a fit state for the introduction of stock is, when small crystal globules of oxygen appear on the plants. This happy condition being arrived at, we may proceed,—and yet on second thoughts it is as well to know something of the mode of respiration of the aquatic animals, since that will be of sure service in making a selection for the tank. The lower animals should be the first chosen, for one very good reason, that their respiration is far less active than in those of a higher organisation, and this applies pretty generally to all creatures inhabiting the watery element ; in them respiration is performed by branchiæ or gills, varying much in form, and by the air with which the water is impregnated ; thus in the Fishes we observe the mouth frequently opened to admit the water, which passing out through the gills serves to oxygenate their blood ; a fish on

dry land does not die from any want of oxygen, but from being asphyxiated in consequence of the absence of that element on which the gills are dependent for a due performance of their functions; but this is not the same in all fishes, for in some (the shark for example) there are simple openings, varying in number to allow of the exit of the water, whilst in some where the *operculum* or covering of the gills is but narrowly cloven, a certain quantity of water is retained, by which they can continue out of their natural element for some considerable time, and even perform migrations overland, from one place to the other, and the Climbing Perch (*Perca scandens*), "quits the water and ascends the roots and branches of the Mangrove trees, an effort it accomplishes by using its ventral fins as feet."

Of course we must to a certain extent be dependent on the part of the coast to which we may be near;—some neighbourhoods are poor in comparison with others, but there are none so barren as not to afford abundance of live stock. We have already mentioned the lovely *Terebellæ* and *Serpulæ*, the Sea Cucumbers (*Holothuriæ*), the centipedal *Nereis*, the ribbonry *Planariæ*, pop them all in, and for Fishes, the tiny *Hippocampus* or Sea horse, the slender Pipe fish (*Syngnathus*), if there is room, are the most desirable; by all means have a Hermit Crab for his comical ways, and there are many others which may be experimented on, such as our Seaweed-wearing friend mentioned previously in these pages,

* Swainson's "Habits and Instincts of Animals." page 116,

but there are some species which on account of their voracity must not be admitted ; a few of the smaller Starfishes must go in, since they will quickly get rid of any decomposing substances : [they flock to the slaughter-houses on the Bay at Geelong, to feed on the *debris* there.] Agassiz has observed that the eggs of the Starfish, after they are laid, are taken up by the parent animal, and kept between its tubes below the mouth. The Starfish bends itself round them, surrounds the eggs with its suckers, and moves about with them. When the eggs have been removed to some distance, it has been noticed to go towards them, take them up again, and move off with them, showing that these animals so low in structure, and apparently deprived of all instinct, (if any animal can be supposed to be without it,) really watch over their young. A Sea-egg or two will be great pets. Of shells we should select specimens of the *Fusus* or Spindle shell, their bright red feet rendering them very attractive, as they crawl up the sides of the tank ; the less rare *Murex* ; Top shells or *Turbo* ; *Trochi* or Hoop shells to keep down the confervoid growths which otherwise would dim the glass sides of the Aquarium, small *Haliotidae* or Ear-shells ; some of the Bonnet Limpets, the lovely gaudily-colored *Aviculas* ; (Geelong), *Chitons*, and others which we cannot mention here.

With a small pocket lens, or with the Portable Microscope which Mr. Warrington has invented for the easier examination of living objects contained in glass bottles or Aquaria, not a day or an hour will pass without something new being discovered, fresh beauties coming to light, which will amply repay any labour

or expense which may have been incurred, and we shall at once own the truth of the Poet's saying, that—

“ Each drop of water is a world containing
Creatures more numerous than the men of Earth.”

Before proceeding to treat of the Freshwater Aquarium, we may briefly mention a few matters—which, though apparently trifling, are yet essential to the success of the Marine tank, as also the well being of the inhabitants of it.

It has already been stated that it is quite unnecessary to change the water, but it may be well occasionally to aerate it by dipping up a small quantity and pouring it rapidly back into the tank, but even this is opposed to the true principles of “compensation,” and need only be resorted to where the animals become sluggish, and the fishes find their way to the surface to obtain there what they should find in their own element. A small syphon of gutta percha or tin will be handy, should it be necessary to draw off or replace the water. The short end must be placed below the surface of the water in the tank, and the mouth applied to it until the water flows, which it will continue to do without further trouble so long as the short end remains under water.

It may so happen, (it is but human nature) that certain species do not dwell amicably with their mates, and others from some cause or the other (not at once apparent) may sicken,—in such a case, remove them without delay to small glass vases where they may be treated as circumstances require. The readiest mode of removing them to and fro is, by means of a small

muslin or fine netted bag, attached to a long handle, (the small utensil used for poaching eggs will explain what we mean). We have grieved to see many fine specimens destroyed on removal, and this makes us give a few words of caution on the subject.

And now having a family about us, we must needs feed them, or we may have to appear before the Bench for maintenance ;—“ an unfortunate *Hippocampus* and fourteen little ones,” or “ a poor old crippled Starfish, (rendered blind by disputative authorities) and a family of orphans ” would settle the matter unfavourably for us very speedily, in which event we should decidedly have to sue for a divorce *a mensâ*, to say the least of it ; but most of the inhabitants find ample sustenance in the water, and for those which desire something more nourishing, a small portion of raw meat may be lowered by a string into the tank daily, so as to be withdrawn at will, and thus decomposition be prevented.

To remove or secure any small objects, a small glass tube of a diameter of about a quarter of an inch will be of service ; to use it, the forefinger should be placed on the top, and the tube placed over the object, which, on the forefinger being withdrawn, will rise into it, and the finger being again applied, it may be removed in safety.

The formation of the *Freshwater Aquarium* will vary but little from that already described : a few inches of sand wherein the plants may root, and a few stones laid on it is desirable, but rock work is not necessary, in fact to our taste, decidedly objectionable and unsightly. Good well water, the experience of many writers has proved to be as well adapted to the

purpose as river water, but the same caution that we recommended in stocking the Marine Aquarium should be observed here. Our readers will have frequently noticed the floating feathery green scum in our rivers attached to stones and pieces of wood, or the bottoms of boats,—this under the microscope displays forms as lovely as they are various, of what are scientifically called *Freshwater Algæ*; have some, by all means,—a small plant of the *Damasonium*—

“ Its white canopies,
Upward turn'd to catch the heaven's dew ! ”

will be a prize, and its large lobed leaves will form a delightful shelter for many of the creatures we shall select for our tank,—the slender Crowfoot (*Ranunculus inundatus*) of our Melbourne lagoons and marshes, the pretty *Myriophyllum* of all the lagoons and sluggish rivers; small “pond weeds” *Potamogeton*, with the lovely floating *Azollarubra* or *pinnata*, soft as velvet, their tiny hair-like roots pendent in the water, are all desirable.

As for stock, it is scarcely necessary to give instructions, since almost everything we can lay hold of, at all compatible with the dimensions of the *Aquarium*, will be likely to thrive;—those who will accompany us in our “Rambles by Rivers,” may glean some information on the subject which it is unnecessary to repeat here.

There are many minor details as to the management of *Aquaria*, for success in which our readers must use their own discretion;—patience, we have already said, will have to be exercised, but above all things avoid overstocking, and never allow the water to become tepid.

CHAPTER X.

" Each rock pool has its treasure, every tide
 Strews on the yellow sand, from Ocean's lap
 Weeds than our flowers more fair."

GRACEFUL as are the Wild Flowers which we have culled to adorn these pages, how much more from their elegant forms, varied structure and surpassingly bright colors, are the plants of the Ocean to be admired ; the more we gaze on them, the greater is our regret that they have received so little attention and consideration at the hands of scientific men, until of late years when such writers as Harvey and Landsborough have opened out the way to a proper investigation of them. "So endless are they" (remarks the former author in the introduction to his *Nereis Australis*) "in these favoured latitudes, and yet so imperfectly explored, that in no country equally accessible can the Marine Botanist find a field to work upon which will yield him better fruit, or furnish to the science which he cultivates more important and interesting results. Here Nature appears in new and sportive forms, in aspect startlingly dissimilar from what we of the old world are conversant with, but connected by the delicate web of affinity in a manner often little expected by the common observer, and only discernible by those who delight to trace in the endless variety of natural forms, the unity of design which characterises the whole." And if our learned friend had reason so to write, when he published the

Work from which we have quoted, how much more reason has he now after a recent visit to these shores, when he records having collected "20,000 specimens of 600 species of Seaweeds, besides incidental collections of Marine Zoology" to laud the richness of our seas!! Already in the beautiful publication which is the result of this visit, have appeared above two hundred figures of the most lovely of our Algæ from various parts of the Australian coast, and most sincerely do we wish the labors of Dr. Harvey may be appreciated as they richly deserve.

Seaweeds, as doubtless many of our readers are aware, differ from land plants in having no true flowers, without any proper roots, but nourished through their entire surface by the water in which they grow, and propagated as many others of the order *Cryptogamia*, to which they belong, by means of spores arranged in various way on the frond.

Algæ are divided into three series; the first of which is termed *Melanospermeæ*, from the spores of the plants comprised in it being black or olive colored. They generally grow at half tide level, becoming less frequent towards low water mark, and gradually getting darker in color the deeper they grow. In this series there are many interesting plants, such as *Sargassum*, *Seirococcus*, the *Sporochinus*, distinguishable by the tuft of soft hairs which crown—brush like—the tips of the branches, the rare *Bellotia Eriophorum*, *Padina* from the Queenscliff pools, and several species of the *Zonaria*.

Many of the *Fucaceæ* were at one time, and perhaps to some extent now are, valuable for the manufacture

of kelp,—some useful as food, and a nutritive diet for invalids, and many yielding Iodine so extensively used in medicine, in great quantity,

“ Comforting the tossings of pain with its violet tinctured essence.”

In the second series, or *Rhodospermeæ*, almost all the plants are purple or rose-colored and some of the most elegant forms which our Nereis affords are found here. For delicacy what can compare with the various forms, like spun glass, of the *Griffithsia*, a genus named after that talented Algologist, Mrs. Griffiths, and the pretty banded *Ceramia*. *Chrysimenia* has its representative in the rock pools at Queenscliff in the species *obovata*, which, when cast ashore and bleached, Professor Harvey fancies has some resemblance to the egg clusters of some of the Gasteropodous Mollusca, so frequent on our beaches, the little horny branchlets (*ramuli*) being invariably ruptured. The *Hypnœa episcopalis* is sure to be met with, and may be at once known by its long and naked hooked branchlets or tendrils, deep crimson at their tips; from which color and their peculiar form, they have been fancifully supposed to resemble a bishop's crozier—and hence the specific term—*episcopalis*. The varied forms of *Plocamium* will give work enough to the student, but their extreme elegance will amply repay him. The family *Rhodomelaceæ* abounds in beauties,—the hairy, blood red *Dasyas*; the dark brownish purple *Lenormandia*, from the midrib of which spring obtuse leaflets (*phylloidia*); the bright *Polyzonias*, parasitic on *Gelidium glandulæfolium* and other Algæ; the oak-leaved *Thuretia*, and the tessellated *Amansia linearis* are amongst the prettiest of the Australian Algæ, the

former composed of a delicate rose-colored network, spread out on the stems which serve as midribs as in an oakleaf; a microscope only will reveal their beauties, no words can adequately describe them.

Amongst the *Chlorospermeæ* there are few which can vie in beauty with the *Apjohnia latevirens* (named after Mrs. Apjohn, a very zealous Algologist); it may be found growing in rock pools at Queenscliff, Lady Bay and elsewhere: in its young stage the plant is composed of a number of club-shaped stems about three inches in height, and of a dark green color, but later trichotomous branches grow from these and form an umbel; at first they are glossy, but afterwards become incrustated with carbonate of lime.

The *Caulerpas* which abound here, afford, we learn from Berkeley, (Cryptogamic Botany, page 162), nutriment to a host of smaller animals. It is these lovely plants that ornament so richly the sides of all the rock pools at the sea-shore. *C. Muelleri* in its place of growth, freely waving its dark green fronds under the clear water, so much resembled the branches of the Norfolk Island Pine, that Dr. Harvey had named it *C. Araucaria*, and *C. scalpelliformis* is named from the knife-like form of its pinnæ. A strange peculiarity in this species is recorded in the "Phycologia Australica," noticed by Mr. Henty, of Georgetown, Tasmania. After having been dried, it will on being subsequently moistened on one side, curl up like the sensitive fish-toys made out of horn shavings, and Mr. Henty has named it the "Marine Sensitive Plant."

The green Algæ (*Chlorospermeæ*) inhabit shallow water, but the Red (*Rhodospirææ*) must be sought

for at a much greater depth by means of the dredge, should the collector desire them in really good condition; the pretty white specimens which our Lady Algologists consider so great a boon, are valueless,—that color, as in the Corallines, being but the condition of death; the *Appohnia lætevirens*, naturally of a pale green, and the black *Melanthalia* with many others, are frequently found in this state, but they should be rejected, or retained only until more perfect specimens are obtained.

Already in our chapter on the *Aquarium*, our readers will have seen how necessary Seaweeds are to maintain the purity of the waters, and thus the lives of the dwellers therein. It is scarcely possible to give any true picture of the vast amount of life dependent on these marine plants. “The great forests of *Fuci* and Seaweeds,” (remarks Mrs. Sommerville,—Physical Geography, 4th edition, page 412) “are everywhere a mass of infinitely varied forms of animal life, either parasitical, feeding on them, or seeking shelter among them.” Darwin too in his interesting book to which we have elsewhere referred, says, that “a great volume might be written, describing the inhabitants of one of these beds of Seaweeds: often as I recurred to a branch of the kelp, I never failed to discover animals of new and curious structure.” Who now then will question the uses of Algæ? Each one indeed—

“Holds a rank, which, lost,
Would break the chain and leave a gap behind
Which Nature's self would rue!”

Absolutely necessary as it is that Algæ should not be subjected to the action of the sun, which causes

rapid decomposition and loss of color, the collector who, to a certain extent, will be dependent on drift weeds, must be up betimes in the morning to take advantage of such specimens as may have been driven in, either by the early tide, or are found floating in the pools which it has left ; there are many species, however, which may be taken from the rocks on which they grow, and thus more favourable conditions be obtained, and good specimens of the *Melanthalia* will frequently be found so firmly imbedded in the sand, as only to be dislodged with difficulty. The roots and fronds of all Seaweeds should be carefully searched by aid of a pocket lens, for they are sure to yield some valuable objects for microscopic investigation, *Membranipora*, *Laomedeia*, *Plumularia*, *Sertularia*, *Campanularia*, &c.

It will not require much practice to enable the amateur to discriminate between what is really worth culling from the dense heaps he will sometimes find on shore ; those he selects may for a time be placed in a small gutta percha bag or covered basket, and on arriving home they should be carefully sorted before proceeding further ; the species of some genera (as *Sporochnus*) decomposing other plants with which they may happen to come into contact. If it is intended to send specimens home, they may be spread out thinly to dry without squeezing or washing, until completely shrivelled, but sufficiently dry to prevent fermentation ; the salt preserves them from decay, and keeps them by its slight deliquescence in a pliant state.* If to forward through the post to a friend,

* *Nereis Australis*.

the most delicate specimens wrapped in very fine muslin and enclosed in thin gutta percha or tin foil, will travel safely and last for some days ; but when required for the *Herbarium*, no time should be lost in their preparation, so soon does decomposition set in, more especially in those of delicate structure ; the process is a simple one, and practice will teach more than a volume on the subject ; yet we will give some concise instructions which will no doubt be beneficial.

The specimens to be preserved having been sorted, so as to keep together the smaller and more membranous kinds, place them for a few minutes into a large bowl of freshwater, and whilst they are soaking there, cut into different sizes some good white thick cartridge paper, (the better it is, the more beautiful will be the specimens) ; then selecting any one plant, transfer it to another dish of clean water, taking care that all sand and extraneous matter has been removed by the first ablution, and when it is properly expanded, place one of the papers underneath it, and gradually withdraw it so as not to disarrange the natural position it has assumed. A forceps or quill is often used to correct any slight defect in the specimen, but we do not recommend it,—a soft camel's hair brush will answer every purpose. The specimen should now be placed on white blotting paper, each sheet being filled, when layers of several sheets must be placed on them, and then more specimens, and more layers of soaking paper. Many collectors place calico or muslin over their plants to prevent the paper adhering to them, but it frequently marks the specimen, and we seldom use it, preferring to give the sheets but a gentle pressure

at first, increasing it gradually as they become dry. Presses and weights are used to press the specimens in the drying sheets, but we in preference use well seasoned boards of about the size of an ordinary sheet of blotting paper, secured round the sides and middle by buckled straps. Every morning, fresh dry sheets must be substituted for the wet ones, and the straps buckled tighter. A few boards and paper are easily carried by the tourist wherever he or she may go, and they have one great advantage, they occupy far less room than any other apparatus which can be used for the purpose.

The specimens being dry, the student will proceed to an examination of them with a view to their classification ; so alike apparently are many of the Algæ, that it is well before sitting down to work to obtain a good collection ; and without being in a hurry to arrange them specifically, first sort them into their various genera, whereby much subsequent confusion will be saved. Many plants (*Bryopsis*, for example,) are so variable that it requires the eye of a skilful Algologist to decide what are species or what merely varieties. It is always desirable to have a few good typical specimens named, and the others can be more readily worked out by means of some good Manual ; that of Dr. Landsborough for instance, will afford much information on the British Genera, many of which are well represented in the Southern Ocean. The aid of the microscope is necessary to identify very many species, and small fragments of the frond may either be fastened down in a cell filled with distilled water, or moistened when required.

The arrangement of species must now be thought of. A few portfolios of limp cardboard with loose cloth back should include all the species of one genus, and more durable ones again receiving all the genera comprised in a Family, and finally these Families may be stowed away in any manner most convenient for ready access.

The study of Seaweeds has been deemed frivolous from the days of Horace and Virgil, but we are proud to be their champion, and hope that these brief pages may instil a taste for the "countless laughing gleams of deep seaweeds" into many who peruse them.

RIVER SIDE RAMBLES.

"FAIREST sight in creation are these Rivers, whether small in their childhood, and found far among the mountains ; or in rich manhood, sweeping through the open plains ; or joining the Ocean at last in slow and exhausted old age—lovely are they at all times ! And of the hymn of thanksgiving, which Nature sends forth from her many-toned voice, mounting up to her Creator's throne, the burden is borne by the Rivers."



CHAPTER XI.

THE MOORABOOL.

" Know ye not that lovely river ?
Know ye not that smiling river ?"

EARLY morning, or a summer's evening such as Keats describes as—

" Full loth this happy world to leave."

is the time for river-side wanderings, when we can divest ourselves of our cares and—

" Bare our foreheads to the cool blue sky,"

for it is at such times the whole world of Nature which retires during the fierce heat of mid-day comes forth in search of food and enjoyment. Let the true lover of Nature, intent on enquiring into her mysteries be stirring early ; an hour after sunrise by the river's brink will give him matter for reflection the whole day long,—it is then the joyous matin song of the feathered tribes may be heard ; then the innumerable families of insects issue forth from their many abiding places to fulfil their destined ends ;—the finny tribes too intent on breakfast, as doubtless we shall be ere long,—rise greedily to prey on any stray *bonne bouche*, which has been wafted on the surface of their element, and the cattle return eagerly with that soft pleasant lowing, which sends our memories back to farm-yards of the old country, from the close stalls wherein they have been pent up for the night, to the grassy dew-sprinkled pastures which they love. How

we long with them to wander "ankle deep in flowers" all the day through, casting off the feeling that there are such things as petty jealousies and rivalries every where surrounding us in our contact with mankind ;—surely the communing with nature does much to soften down these feelings to which unhappily we are all more or less prone, and teaches us what mere specks we are in creation, and how much enjoyment might be had during our comparatively brief existence did we go the right way to work to find it. The lover of Nature becomes imbued with a kindly feeling to every living thing, and this surely must in a great measure be extended to his fellows.

There is a truth in the saying of old Isaac Walton, that the mere sitting by a river's side, is not only the quietest and fittest place for contemplation but will invite one to it. A Spanish writer too says, that "Rivers, and the inhabitants of the watery element, were made for wise men to contemplate, and fools to pass by without contemplation." Now, although we do not for one moment pretend that our Rivers rival those of Epirus, or Selarus, or the dancing waters of Elusuria, mentioned by our quaint piscator, or even those by which we have strolled at nightfall in the old country—the shrill scream of the Otter, the chorus of the Night-jar, the heavy splash of the Water-Rat, and the hoot of the Owl, the only sounds which disturbed the stillness, save and except the rising now and then of a splendid trout to our fly (for a lover have we been too of the gentle craft, and a paper of hackles even now recalls all the old scenes and excursions), still they have their own beauties, believe

us, so we will be their champion. Have you ever visited the Moorabool? If not, then take advantage of the first fine day which offers itself, and away with you afoot to judge for yourself of the natural charms of this much maligned stream; we had heard it called slow, and sluggish, and paltry, but to it nevertheless we went, for we are not of those who are led away by popular prejudice, and there we beheld enough to clear it, in our eyes at least, from the slur cast upon it; truly—

"Hic gelidi fontes, hic mollia prata."—VIRGIL.

"Here are cooling springs, here grassy meads.

Let us walk now to the bridge at Fyansford, some two miles from Geelong; passing on our way the junction of the river which forms the subject of our paper, with the Barwon, just below the Falls:—here the banks remind us of the dark glen-like scenery of some parts of Ireland,—high hills, whose declivities reach to the water's edge, dark hollows intersecting, into which the daylight scarcely seems to glance, and for the various forms, animal and vegetable, which add to the charms of the picture—

"No breathing man

With a warm heart, and eye prepared to scan

Nature's dear beauty, could pass lightly by

Objects that look out so invitingly

On either side."

First now are the glittering Dragon flies, either fluttering over the plants which grow here, or striking us with amazement at their rapid hawk-like flight, and there is the black fan-tailed Fly-catcher, whose breast is pure white, and the remainder of its plumage jetty black, restlessly darting from one spot to the

other, wagging its tail as it alights, and we cannot but pause to listen to the liquid notes of the Reed Warbler, hiding—

“ And abiding
From the common gaze of men,
Where the silver streamlet crosses
O'er the smooth stones, green with mosses,
And glancing,
And dancing,
Goes singing on its way.”

We walk awhile up the stream, and small as it is, the banks are indeed lovely to behold, planted as they are, despite the sad havoc made by cattle to which we may owe the barrenness of much of our river scenery, with rich dense masses of the fresh green Sea-rush, *Scirpus maritimus*, known to many by rivers near the sea at home, from the cover of which start a fine pair of Bitterns, who fly heavily and lazily away. Everywhere we are treading under foot the spicy Mints, the more fragrant the more they are crushed; the delicate *Convolvulus* is twining elegantly round the stems of the Loosestrife, the pink flowers of which are always attractive, and the lovely white crimson petalled flowers of the *Damasonium* just peep above the surface of the water on which its dark green leaves float so refreshingly; our old friend, the Vervain, is here too, and the pretty pink *Melaleuca paludosa*. The crows' nests deposited on the few high trees which are left, show how the residences of the settlers on the margin of the river must have been despoiled of their palings and brushwood during the winter floods, which on some occasions have risen above the bridge at Fyansford. How merrily rushes the stream over its pebbly bed, musical as a young girl's laugh, anon,

widening and becoming deeper, flowing quietly and gently, like the more mature thought of manhood. The very scum in some parts teems with animal life, skimming the surface of the water—

“ ——— Flumina libant
Summa leves.”—VIRGIL.

and we carefully place portions of it in our bottles,—and in your leisure, beauties such as few of you have ever imagined, may be discovered therein ; hair-like filaments of the most exquisite patterns conceivable,—long tubular cells containing beautiful green spiral coils, or numerous spherical granules or zoospores, moving restlessly about, and frequently striking against the walls of the cell, as if anxious to escape from confinement. This point gained after a while, they speedily begin to move hither and thither, now wheeling round and round, now oscillating from side to side, and now as if from sheer fatigue remaining quiescent. “Truly wonderful,” says Hassell, in his “Freshwater Algæ,” “is the velocity with which these microscopic objects progress, their relative speed far surpassing that of the fleetest race-horse. After a time, however, which frequently extends to some two or three hours, the motion becomes much retarded, and at length after faint struggles, entirely ceases, and the Zoospores then lie as though dead ;—not so, nevertheless—they have merely lost the power of locomotion,—the vital principle is still active within them, and they are seen to expand, to become partitioned, and if the species be of an attached kind, each Zoospore will emit from its transparent extremity two or more radicles, whereby it becomes finally and

for ever fixed. Strange transition from the roving life of the animal to the fixed existence of the plants." Of these Freshwater Algæ, we may find here specimens of *Conferva*, *Chara*, *Zygnema*, *Draparnaldia*, *Cladophora*, *Edogonium*, and many others, probably many species of each. Not useless are these minute plants either, affording as they do, food to so many tiny inhabitants of the water, and acting as purifiers to the water in which they dwell, decomposing and removing all that is noxious, and restoring to the water oxygen, which as we have previously stated, is essential to animal life.

In a former chapter we have recorded the *Limnæa*, *Physa*, and *Planorbis* as being abundant here, but on every one of the trees lying half in, half out of the water, are long dark shells (*Unio*), and from the way in which one end is invariably broken, they are evidently brought there by some creature which feeds on the dwellers within them, either the Bittern or the Water-Rat.

We have been fishing during our stroll, but it is sorry work, not a nibble scarcely but from a host of tittlebats or some such small fry, which at every cast of our bait have been raising our hopes to the highest pitch of expectancy;—we have changed it a dozen times, and our hooks as many more, but without success; still we can recommend our friends devoted to the sport to make a trial on the upper portions of this river, where Trout, Black Fish, and Eels may be taken and afford some sport. Well, if we cannot fill our creel there is nothing which so thoroughly refreshes us as a ramble away from the conventionalities of town

life, where we can breathe freely, and we cannot but think with the agreeable author of "Life in the Woods," that one degenerates without frequent communion with Nature. "A single tree," says he, "standing alone, and waving all day long its green crown in the summer wind, is to me more full of meaning and instruction than the crowded mart or the gorgeously built town." Many is the happy hour we have whiled away here, half dreamy quiet thoughts stealing over us as the stream glided onwards, until the setting sun and—

"The flitting

Of divers moths, that aye their rest are quitting."

reminded us that we had many miles to go before reaching our destination. These were happy days indeed, on which we look back with pleasure not unmingled with sadness, for whose dreams are ever realised?

The higher up the "reedy stream" we go, the more beauties are unfolded to us; the Dog Rocks at Batesford of themselves will well repay the visitor, and the Geologist may load himself with fossils from them, and in every little indentation in the mud made by the footsteps of cattle by the river side, look well out for, (and bottle when found,) specimens of Desmidiæ and Diatomaceæ, which they generally contain. Were it not for the horror we in conjunction with others entertain of the Mosquito tribe, we would say have some in the Aquarium, for in their various stages they are interesting creatures,—in the larva state, having their heads always downwards, and their tails which are provided with a fan-like apparatus serving in some

measure for respiration, on the surface of the water ; whilst in the more advanced pupa stage the order of things is reversed, and the head takes the place of the tail, coming uppermost to the water's edge, and the respiratory organs are modified accordingly. Not a day passes in Summer, but we have unfortunately too frequent opportunities for witnessing the metamorphoses of these pests—in our ewers and our water barrels : to remedy the annoyance occasioned by their presence in the latter locality, a friend suggests a covering of very fine wire gauze, which if it would not prevent their development into the imago or perfect stage, would at any rate effectually put a stop to their roaming abroad, seeking whom they may devour. The roaring of the falls on the Barwon, just above where the two rivers meet, tempts us to stroll thither on our way homeward, and truly it is a sight which would gladden the heart of any real lover of the picturesque, the water dashing impetuously and musically down over the rugged rocks, lying in the river's bed, whilst on each side are cliffs, whereon one might botanise to his heart's content—

“ Through meads and groves now calmly roves
 The stream with many a bending ;
 In rippling song, through rushes long,
 And pendent willows wending.

But groves at last and meads are passed,
 And still with ceaseless motion,
 The water glides, to pour its tides
 Into the trackless ocean.”

That feathery looking plant which covers yon bush, is a *Clematis*, belonging to the natural order, *Ranunculaceæ* or Crowfoot, and as much deserving

the popular name of "old man's beard," as its twin sister of England and Ireland, where the field mice pull the feathered awns as soft linings for their nests. Of Violets, there is the large blue Betony-leaved (*Viola betonicifolia*) not certainly "stealing and giving odour," but playing the very mischief with us as it brings back to our mind's eye the groups of white and blue sweet-scented flowers well nigh hidden in their dense leafiness which tempted us to wander abroad in the fields and hedgerows of England, ere the chilliness of winter had disappeared. The green and scarlet native Fuschias may be gathered here, the *Sida pulchella*, *Indigofera sylvatica*, the cream-colored *Stackhousia monogyna*, with many of the *Geraniaceæ*. Turning aside to get a better and fuller view of the falls, which with the stream*swollen by the late floods are grander and more impressive than usual, we observe the Ladies Bedstraw, *Eurybiopsis*, *Otula*, so frequent by every wall and roadside, and of *Goodeniaceæ*, many species, which will be the better recognised, if the large leaved bushy one with ovate-dentate leaves and yellow flowers which is overhanging the stream, is first carefully examined, as it is one of the most conspicuous of the tribe. To embody here any idea of the many gems to be collected in this locality would be but tedious, but there are some rivalling the choicest plants of which our green-houses at home can boast, and all to the very tiniest, forming an important link in the Vegetable Kingdom; and as for Ferns,—not a dark or sheltered nook is without them. Well has Christopher North said, that "Nature does not spread in vain her flowers in flush and fragrance over every

obscure nook of the earth,—simple and pure is the delight they inspire. Not to the Poet's eye alone is their language addressed. The beautiful symbols are understood by the lowliest minds."

And although diverging somewhat from our path, the temptation of obtaining some good specimens of the Caterpillar Fungus tempts us up to Montpellier, and thence away to the Barrabool Hills where they abound;—this singular vegetable production springs from the neck of the dead larva of a moth, which, though when living, of a soft or fleshy character, when dead becomes perfectly hard and almost horny, so that it seems to form one substance with the parasite. This parasite is termed *Sphaeria*, and species of it are dispersed through the Temperate Zones, growing generally upon decayed vegetable matter, and apparently immersed in the substance on which they are found, and so abundant that scarcely a decaying stick, leaf, or even grass stem, but presents some form or other of them; some too are met with on plants which are *still living*, but this may be looked upon as indicating a loss of vitality in the part of the plant so attacked. Hooker in his "*Icones Plantarum*," (Vol. 1, Tab. xi., published in 1837,) figures a New Zealand species (A), named after its discoverer, "*Robertsii*," and it is described as "black and cork like, the stipes or stem elongated, flexuose, simple or branched, the head acuminate, wormshaped." The native name of this plant is *Areto* or *Hotito*, and the residents in New Zealand call it the Bullrush Caterpillar, to which plant, more particularly in mature specimens in a state of fructification, it has some

resemblance. The Caterpillar on the larva of which this grows is that of the *Hepialus virescens*, a moth belonging to the section *Heterocera* of Doubleday, and from its rapid flight known as the Swift Moth.

In 1857, a species differing in no way, so far as we can judge from dried species, from the former (although the larva is somewhat more attenuated than that figured by Hooker,) was discovered in Tasmania, and we are indebted to the kindness of W. K. Hawkes, Esq., of Franklin Village, Launceston, to whom the scientific world owes much of what is known on the Natural History of this interesting family, for a very well selected series of specimens, the plant arising in all, as in the former case, from the nape of the neck, and in one individual also from the lateral spiracles, a circumstance to which our attention was called, prior to receiving any specimens so attacked, in a very obliging communication on the subject from Professor McCoy. The larva varies from two to three and a half inches, and the fungus from one to seven inches.

Another species (figure B), the *S. Gunnii*, was found in 1844, very abundantly at the back of Mr. Hawkes' garden in Tasmania,—it is totally unlike the former, the larva being of a lighter color, and varying from one to three and a half inches in length, and the fungus from one to eight inches, very black at the head, which is clavate; in some instances two stems arising from the same source. Of this species Mr. Hawkes writes:—"It is found generally under young Wattles or Gums, immediately after the first autumnal rains (about March). The Fungus with one to five stems, but generally with only one, usually

shoots from the nape of the neck, in rare instances from other parts of the body, very seldom from the *neck* and *tail*. (In thousands of specimens four or five of these only have come before me.) The *Chrysalis* is found too with one stem from the upper part, and sometimes also encircled with rings of Fungus. The burrow made by the larva is about eighteen inches deep, the direction inclined ; at the mouth the Larva and Chrysalis may be seen on the least alarm to retreat with precipitation. The perfect insect is a large grey moth coming forth in April or May."

Our specimens from the Barrabool Hills (c) appear to differ from *S. Gunnii*, only in being considerably smaller, as far as our own observations have extended, —in one individual the stipes rises as usual from the nape, whilst another from the same source creeps downwards to almost the whole length of the larva (D).

At the August meeting (1854) of the Royal Society of Tasmania, a communication was read from Mr. H. Hull, on a paragraph in the writings of Christian Franc Paulinus, in the 9th century, which states that certain trees in the island of Sombbrero (E I) have large worms attached under ground in place of roots, and Mr. Hull considered this as an indication of the knowledge at that early period of some species of plant Caterpillar ; any way one species *S. sinensis* (Berkeley) found in Thibet, has been described in our Pharmacopeias. It is figured in Lindley's "Vegetable Kingdom," the stipes being made up in bundles for the market. Redgood remarks of it, that it is developed on the neck of a Caterpillar, (probably an

Agrotis,) and is considered to possess strengthening and renovating properties, but owing to its rarity is only employed in the Emperor's palace after this fashion:—a duck is stuffed with five drachms of the Fungus and roasted slowly, and after the flesh is thoroughly impregnated, it is to be eaten daily for eight or ten days.

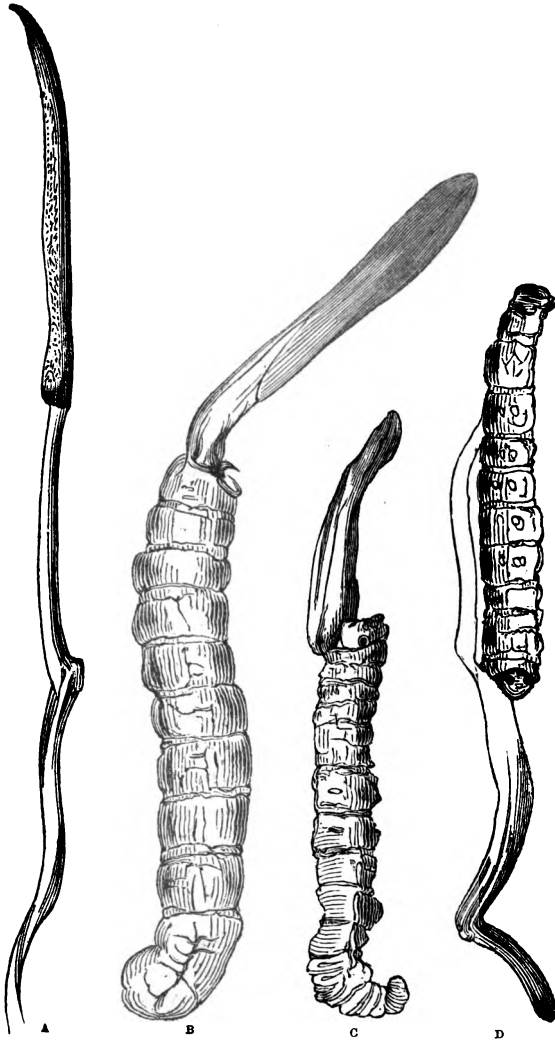
The doubt arises in our mind, whether the larva is attacked when living and eventually killed by the germination of the plant, or does its dead body afford that peculiar stage of decomposition favorable to the growth of the Fungus? In support of the former opinion, we know of one species of Fungus, the *Botrytis Bassiana* causing the disease called *muscardine*, and resulting, as C. R. Bree, Esq.; in a paper on the "Diseases of Silkworms," (Naturalist, 1858, p. 215,) explains, from an excess of acidity attacking the worm before its entrance into the chrysalis state, and in the West Indies it is not at all uncommon to see a description of *Podistes* flying about with plants of a fungoid nature streaming from its body, the germs as Carpenter ("The Microscope," page 379,) suggests, having been probably introduced through the breathing pores at their sides and taken root in their substance, so as to produce a luxuriant vegetation. A specimen of this wasp with a *Sphaeria* attached, from Jamaica, was exhibited at the Botanical Society of Edinburgh, in August, 1858. Nor is the human frame exempt from such growths, for *Sarcina ventriculi* is the cause of some painful forms of dyspepsia, and Dr. Carpenter speaks of the probability of its inhabiting the stomach in large quantities, and for a

considerable time without causing inconvenience; and in animal tissues the Fungi are produced more especially in certain diseased conditions of the epidermal system, or of the mucous membranes, and their presence in such cases seems to cause an alteration in the phenomena of disease. (Balfour's "Class Book of Botany," Vol. I, p. 346.)

Dr. Hooker, whilst in the "Erebus," collected specimens, and all the information he was able, but still confesses himself at a loss to account for its development. Mr. Taylor and Mr. Colenso, he adds, being of opinion that in the act of working into the soil to undergo their metamorphosis, the Caterpillars get the Fungus spores lodged in the first joint of the neck, and finally settle head uppermost. So far, the opinion of our friend, (Mr. Hawkes) is corroborative, but he further adds, that "having gained access to the interior of the body, the spores germinate at the expense of the fat which lies beneath the skin of the animal, growing rapidly on the material that ought to feed the grub, and at last killing it by exhaustion. The growth of the plant proceeds,—all the soft parts of the grub are progressively consumed or appropriated by the plant, which, after thus distending the integument of its prey, bursts forth at the weakest point, usually that piece of fine skin which connects the head and body of the grub; the plant, now requiring light, shoots out of the earth, develops its spores which are dispersed in the air and fall to the soil, prepared to take advantage of any similar nidus into which they may be accidentally introduced."

Even with these opinions before us, we are disinclined to believe that any insects in a *healthy* state can afford those conditions which are essential to the development of fungoid growths, for as is remarked in Art. "Enterophyta." Nat. Hist. Sect. Engl. Cyclo., "a failure of the ordinary vital powers to carry on the healthy processes of life seem ordinarily to be the inviting cause of such a development of these plants as would constitute a disease," but we conceive that it is only after life is destroyed and decomposition set in that the *Sphæria* commences to germinate,—our friends however must observe and judge for themselves.

But our ramble has occupied more time than we anticipated, so we will only descend the hill towards the Barwon on our way homewards, gathering as we go some specimens of the remarkable *Polygonum junceum* or the *Crantzia Australasica* growing submersed in the water.



CHAPTER XII.

THE HOPKINS.

"Ignota videre
Flumina gaudebat,"—OVID.

WESTWARD ho ! Further away from the haunts of men to where, undisturbed by anything but the sweet sounds of Nature, with lovely wild plants around us, giving odour as we press them, we may ruralise at will. We have long had a friendship for this River, for years have wandered, day by day, on its margin, have seen it in all weathers and in all moods,—now gliding along with scarcely a ripple but that caused by the wing of the swallow as it skimmed its surface, or the masses of Jelly fishes which at some seasons abound here, at other times disturbed by winds and floods ; which was its grander aspect we never could decide, since each had its peculiar charms to enchant us, but glancing now round our study walls and recalling from the representations thereon, the companions of our rambles there, how pleasingly we are reminded of the happiness we enjoyed—red letter days indeed !

This pretty stream rises in the Pyrenees and flows near Mount Ararat, but passing somewhat away from the Gold Fields, does not prove of service for washing the precious metal,—on it flows through high banks and low, with here and there a steep rock on one side, and rich arable land on the other, the former densely covered with festoons of the bright pink *Mesembryan-*

themum or "pigs faces," the green *Corraea* or native *Fuschia*, the russet flowered *Pomaderris*, and many others. Numerous are the tributaries to the stream in its course,—Muston's Creek, the Salt Creek from Lake Bolac, then about ten miles from the sea, Black's River or Emu Creek, and further on, Cudgee or Brucknall's Creek : these with freshwater springs supply the current flow. A little lower down we come to the Falls of the Hopkins, whose limpid waters sparkle in the sun, and a few miles further still, to the Allansford Bridge, past which the stream glides musically along, like the murmur of a pebbly brook in the old country, through rich black soil, well stocked with flowers, and tenanted by industrious hard-working men. On the margin of another waterfall, about a mile onward, up to which the tide flows from the sea, is Tooram, the station of John M. Allan, Esq., one of the earliest settlers in the district, thickly surrounded by Eucalypti, Cherrytrees, Box and Light wood, old and young, such as we may travel a long distance without again seeing in such luxuriance.

Nor are these richly foliated trees, quiet as they seem to us now, destitute of animal life ; come you at nightfall, and under the guidance of one of the many Natives who invariably camp here, watch the merry gambols of the Flying Squirrels and Opossums, leaping from branch to branch ; listen to the heavy munching of the Wombat, who is feeding timidly on the grass which surrounds his burrow, into which, if he observes us, he hastens with a celerity which his looks belie ; the slothful Koala, or Native Bear too, comes forth to feast on the young leaves of the Gumtree, and the long-

snouted Bandicoot (*Perameles nasuta*), climbs about the fallen timber. We have a specimen before us as we write; it measures from the tip of the snout to the end of the tail 16 inches, the tail itself being $2\frac{1}{2}$ inches. Iris very dark brown, upper parts of the body dark grey, the lower white, the tail slightly hairy, certainly not scaly, as some writers state (at least in the individual before us), head very long, with slender naked muzzle; fore feet with five toes, the two middle very long, with long claws, the third much shorter, and two clawless rudimentary ones placed some distance behind the others. The hind foot has four toes, the middle one remarkably long, those on each side being only half the length, and the fourth some way back, also rudimentary. One of the claws on the side toe is bifid. We have taken the young from the pouch about September, at which time also the Flying Squirrel breeds.

The Natives avow that the Koala, (*Phascolarctos cinereus*), never drinks water, and as we have elsewhere remarked, we are inclined to believe that not only it, but all the animals of this country can subsist for a considerable time without; yet in confinement we have frequently seen it thrust its head into a pan of water, probably to supply the moisture which it missed in the dry long gathered gum stalks and leaves which formed its food,—when these were not fresh, the stems were always devoured first, but when new and moist the leaves were eaten with infinite relish. There always appears to us something cruel in keeping any animal of this kind in confinement, where not only it is deprived of its requisite food, but is unable to follow

its natural habits and instincts, and what food it does get, is doled out at prolonged and irregular intervals, by the hand of some child to whom it has been given as a pet. They are remarkably fond of being noticed, and when scratched on the head, utter a low sort of growl, expressive of their gratification.

Singularly lazy is this creature in all its movements, crawling from bough to bough, with its young one grotesquely holding on to its neck, and even when fired at, it scarcely deigns to notice, certainly does not attempt to evade the danger.

Down the river but a few hundred yards, and we reach a pretty well timbered hillock, which is a favourite resort for holiday folk, who pic-nic here on festive days. We notice shells of the Oyster in abundance, which has evidently existed here in former days; but no trace of any beds can now be discovered by the enterprising fishermen who reside here about, and on the stones we get fine specimens of the Acorn shell or *Balanus*; this belongs not to the *Mollusca* or true shell fish, but to a class called *Cirrhipeda*, from their cirrhi or arms, the true position of which in the Natural Kingdom has awakened much discussion. In this *Balanus* so called from the Greek *balanos* (an acorn,) you will observe that the shell is sessile, being firmly attached by its base, and consisting of six different pieces or valves, varying much in size, but forming a hollow cone: in the opening of this cone are four other valves which serve as an operculum or covering;—wait until the tide returns and you will see issuing from an aperture formed by the opening of two of these valves, the most beautiful plume of feathery

like cirrhi, which are so densely covered with hairs that the minutest thing cannot pass through them. "Poor unthinking wight," remarks Gosse, "whoever he may be, Infusory, or Annelid, or Cypris, or germ of Sponge, that meets the clutch of those enclosing fingers ! The bristles that pass across the interspaces, locking into each other, shut out all chance of escape ; the living net is whipped in, the valves close over the orifice, and the ill-fated wretch presently finds himself in the cavernous maw of the hungry Cirrhiped." And there is an allied genus which may be found shorewards—the common Barnacle, adhering by its long flexible and contractile peduncle to pieces of timber, bottles, &c. ; its shell which is milk-white, is almost flat and composed of five pieces, two of which on each side are triangular, with an elongated piece at the back ; the cirrhi in them are very like those of the *Balanus*, being rolled and unrolled with such rapidity that a whirlpool is formed into which minute objects are drawn and captured. This Barnacle is interesting, as having been the subject of an egregious error on the part of some of our old Naturalists, who gave it the name of *Anatifera*, from an idea that the Barnacle Goose (*Anas erythropus*-Penn.) was produced from it, —old Gerrard so mentions it in his Herbal, and figures it in all its stages from the shell to the bird. Aldrovandus too gives a quaint picture of the Barnacles hanging from a tree, and the "Goslings hatched on trees," swimming about under the shade thereof, with this superscription.

A little picturesque island next meets the eye, endeared to many from its having been chosen as a

burial site in early days for near relatives. Further on, after passing some lovely spots in the bends of the stream, overhung cypress-like with the drooping foliage of *Casuarina*, we arrive at *Bethungall*, where reside more hospitable friends, to whom we never fail to pay our respects in passing, and from this point it is an easy walk to the "Caves" on the coast, alluded to at page 33. Herds of Wallabies frequent this neighbourhood, and even now the Emu is not unfrequently met with, finding abundance of food in the young shoots of the Brake Fern (*Pteris esculenta*.) On the high banks here, where flourish some gay flowering plants, the Fish-hawk rears its young, and the tracks of the Native Cat are everywhere conspicuous. The Cormorant (*Phalacrocorax leucogaster*) with its olive brown plumage and white breast, mopes on any snag which may rise out of the water, taking flight for a few yards as our boat disturbs him, but anon perching again the moment all is quiet. The pretty Night or Nankeen Heron, the Blue Crane, and also the White Egret are met with here.

At last, having been steadily sticking to our oars for a few minutes, we catch sight of—

"The sea! The sea! The open sea!
The blue, the fresh, the ever free."

but before we reach it, let us rest awhile and light our pipes, as the air blows keenly in from the coast;—here is a spot for the Naturalist!! Look out on the mud flats yonder, there is a splendid *Ibis* picking its steps carefully, and keeping a sharp look out for any small *Crustacea* which fall in its way,—some noble Pelicans too with well crammed pouches we see,—in the shallow

water are myriads of the long turreted shell *Cerithium*, *Trochi*, and others, and where the stream deepens there is a fine Black Swan (*Cygnus atratus*) floating majestically along. Certainly no "*rara avis*" is this bird in Victoria, inhabiting all the Western lagoons in flocks, varying from two to six or probably more;—they generally move from one place to another at night, uttering most discordant cries as they fly. Bishop Stanley in his "History of British Birds," p. 393, remarks that although this bird cannot dive, it contrives to immerse itself so deep in the water, as to render its body nearly invisible, and thus avoid detection.

The boat-house of the "Faugh-a-ballagh" Club, reminds us of happy days we have spent with its jovial crew on this stream, and it is worth while to land here to stroll through the Cemetery which is so well cared for,—no ostentation whatever in laying out the grounds, but a quiet rural simplicity pervading everything connected with it, and wild flowers springing up spontaneously to deck the graves of those lying there.

Next we come to the Fisherman's hut and punt;—let us rest again on our oars, and see the result of his haul. Here are Bream, Mullet, Salmon Trout, and a stray Herring (which fish is generally taken with a fly higher up the stream), in plenty surely to augur well for the success of any Fishing Company properly organised. We observe specimens of *Paludina*, or Marsh Shell: and in flower the pretty *Myoporum*, tightly embraced by the dodder-like *Cassytha*. We have a specimen of *Trigla*, or Gurnard, captured here some few years since, which if not identical with the

Flying Gurnard, which darting from the sea is able to sustain itself for some time in the air, as in the *Exocoeti*, or Flying Fishes, is at any rate nearly allied to it. This pretty fish was about a foot in length, head covered by a bony plate, terminating just before the first dorsal fin in a spine on each side, teeth much crowded, upper jaw defended on each side by short projecting spines. The eyes are also protected on each side by two sharp spines, arising out of the bony plate before mentioned. The first dorsal is pinkish, about three-quarters of an inch behind the termination of the bony plate and 9-rayed. Second dorsal immediately behind, silvery, with two pink lines across, extending to within half an inch of the tail, 15-rayed. Both these are placed in a furrow, with a row of spines on each side; the pectorals are divided, the upper being very large, dichotomously ribbed, of an olive green, with ultra-marine spots; three cirrhi-like processes, attached at the base by a membrane, form the second pectoral; ventral fins immediately under the pectoral, 6-rayed and pinkish. Anal commences at termination of ventral and extends to tail. Head and upper parts brown, with occasional dots of black, sides slightly silvered, under parts white, mingled with a reddish tint.

But coming to the sea, the channel of the river is somewhat narrowed, consequently the stream rushes down with greater rapidity, now forming deep pools which have formed our bathing places in the morning, and our fishing ground later in the day, from which, as long as crabs were to our hand to serve as bait, we never failed to secure a dish of Bream. The entrance

to the river from the sea is barred by a reef ; but it is about this locality that we can collect such magnificent *Algæ*, driven in here by the high waves. Let us see now ; here is a mass which we pull in on our oar's blade, and we find *Areschougia conferta*, *Acrotylus*, *Apjohnia latevirens*, *Ballia Brunonia* ; and in a heap thrown up on the beach we discover no less than six different species of *Caulerpa*, viz. :—*geminata*, *filifolia*, *sedioides*, *hypnoides*, *scalpelliformis*, and *obscura*, *Codium tomentosum* frequent, *Callophyllis*, *Bryopsis*, *Curdicea*, *Conserva*. There are little rocks at the mouth of the river on which grows the elegant box-leaved *Alyxia*, the wood of which is most fragrant. We once nearly lost our life whilst algologising on the beach near this place ; the wind had been blowing a perfect hurricane for many days, causing such a commotion along the coast, as those only who reside westwards can understand,—a lull came, and we ventured forth, tightly buttoned up, staff in hand, to make fresh discoveries amidst the dense masses of seaweed cast on the shore. We noticed at a few paces distance a lovely *Calithamnion* left dry by the retreating waves, and rushed forward to secure it ere their return. We succeeded. Another met our eye, and whilst stooping to grasp it, we were thrown down by a crested wave, covered from head to foot with sand, and had we not saved ourselves by thrusting a long stick which we carried into the ground, we should hardly have been here to-day to speak of the beauties of the Hopkins. Before closing this chapter, and bidding farewell to our readers we must turn to a very pleasing article by Mackie, on " Seaweed as

Objects of Design," which lately appeared in the "Art Journal :"—Bright are the flowers of the earth, the first and choicest ornaments ; pure, simple, and holy, their charms can ne'er decay, though familiarity and inconsistency may vulgarise, and innumerable misappropriations make us sometimes wish for the contrast that other less showy objects would afford. While the fields are radiant with their beauty, and the gentle zephyrs fragrant with their scented odours, the great tide ebbs and flows over the flowerless plants of the sea. Around the huge rocks the perennial fringes of the olive Fuci, undulate in graceful folds among the swelling waves. I do claim for the neglected vegetation of the Sea-side, an elegance of form and structure, a suggestiveness of mathematical designs, a poetry of association and typical expression, a simplicity and modest gracefulness, which will entitle them to the best efforts of the designer."

Then Designers, Conchologists, Algologists, or pure lovers of nature, whoever and whatever ye are, go to the banks of the Hopkins.



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